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The Massachusetts Medical Society

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NEW ENGLAND SURGICAL SOCIETY

A STUDY OF TWO HUNDRED AND THIRTY-SIX COMPOUND FRACTURES TREATED AT THE MASSACHUSETTS GENERAL HOSPITAL*

BY ERNEST M. DALAND, M.D.†

DURING the period 1923 to 1931, two hundred and thirty-six compound fractures were treated in the wards of the Massachusetts General Hospital besides compound fractures of the skull, face and jaw, which are excluded from this report. Two hundred and fourteen were fresh fractures and twenty-two were old cases. The end results are known in one hundred and fifty-one fresh cases and eighteen old cases.

The treatment of compound fractures involves the double problem of dealing with the fractured bone and the injury to the soft parts. The purpose of this study is to determine from our own experience what is the most satisfactory method of handling lesions of this type.

The damage to the soft parts varies according to the mechanism of the fracture and according to the degree of trauma. The damage is not so great when the fracture is due to indirect trauma, in which case the bone ends are forced out through the skin, as it is when an external force injures the soft tissues before breaking the bones. We have classified these compound fractures as follows:

1. Indirect violence
   a. Puncture wounds.
   b. Extensive soft tissue damage occurring from within out.
2. Direct violence
   a. Cuts, lacerations and bullet wounds.
   b. Extensive wounds from massive trauma.

By "sepsis" in this report, we mean the development of a purulent discharge in the wound. Minor stitch abscesses have been included as septic wounds even though they were not serious enough to change the result.

TREATMENT

On entry to the hospital, morphine is given in sufficient quantities to relieve pain. The wound is carefully inspected to determine the amount of soft tissue damage. Injuries to blood vessels, nerves, muscles and tendons are noted, and a decision is made as to what structures can be saved and what must be sacrificed. The skin around the wound is cleaned with benzine and is shaved, the operator shaving away from the wound with a sterile razor. Ether is used to dry the skin. Iodine is then applied to the skin and the wound covered with a sterile dressing. In some instances no further attention may be paid to the compound wound, but later we shall learn whether such treatment is safe. The patient is then ready for a more careful palpation of the fractured bones and for an x-ray examination. Temporary splints must be applied before the patient is transported to the x-ray department.

Antitetanic serum is given to all patients with compound fractures. A preliminary test is made to determine possible sensitivity to horse serum by injecting 0.1 cc. of the antitetanic serum intradermally. If there is no skin reaction in twenty minutes, an intramuscular injection of 1500 units is given, if the patient is an adult. A child receives a lesser dose, according to his age. If the patient is sensitive to horse serum, he is desensitized by giving small amounts subcutaneously at half-hour intervals. The doses are gradually increased until the full amount is given. Adrenalin is used to combat any untoward reaction.

If the wound is more extensive the same preliminary treatment is carried out, x-rays taken and the patient sent directly to the operating room. In the meantime a visiting surgeon has been called and he usually carries out the operative treatment. If shock is present, the patient is kept on the "shock table" until transportation is thought safe. Occasionally operation is done with him still on the "shock table". Ether or gas oxygen is the anesthesia of choice.

The operative procedure consists of a thorough débridement. The wound must be opened up widely and the bone ends exposed. Four to ten quarts of normal salt solution are used to irrigate all parts of the wound thoroughly, the assistant opening up various parts of the wound. This is a very important feature of the treat-

*From the Fracture Service of the Massachusetts General Hospital.

Read at the Annual Meeting of the New England Surgical Society September 30, 1933, at Boston.

†Daland, Ernest M.—Chief of Surgical Out-Patient Service, Massachusetts General Hospital. For record and address of author see "This Week's Issue," page 1034.

ment. Unless the wound is well opened up, the infected material will be forced into the wound instead of being washed out. The skin edges are excised and all traumatized and infected tissues are removed. Several knives are used in succession, as a sharp knife causes less trauma than a pair of scissors. All traumatized fat, fascia and muscle must be cut away. Normal muscle may be recognized by bleeding and twitching when it is incised. Small bone fragments unattached to periosteum should be removed and the edges of soiled bone trimmed with rongeurs. Large fragments with periosteum attached to them should be thoroughly cleaned and put back. Even if they do not live, their calcium content may aid in establishing union.

A reduction of the fracture may be accomplished at this time unless it is necessary to open up new areas. We do not advocate the use of bone grafts or bone pegs in the primary fixation of compound fractures and we have rarely used steel plates. Skeletal traction may be applied distal to the wound, provided this procedure is carried out as a clean operation.

The problem of whether to close the wound and whether to use the Carrel-Dakin method now must be considered. Certain of the smaller compound wounds may be closed without drainage. If Dakin solution is to be used, the tubes must be inserted at the time of operation and the instillation of the solution started at once. Details of the Carrel-Dakin treatment are considered at the end of this paper.

TABLE I

COMPOUND FRACTURES TREATED IN HOUSE

Region	With End Results		Without End Results		Totals
	Fresh Cases	Old Cases	Fresh Cases	Old Cases	
Phalanges and metacarpals	34	1	20	1	56
One or both bones of forearm or wrist	28	0	15	0	43
Humerus	8	3	2	2	15
Scapula	1	0	1	0	2
Phalanges and metatarsals	11	0	5	0	16
Tarsus	3	3	2	0	8
One or both bones of leg or ankle	52*	8	13	0	73
Patella	1	1	1	0	3
Femur	11	2	3	1	17
Pelvis	2	0	1	0	3
Total regions fractured	151	18	63	4	236
Duplicates (2 regions in same patient)	6		1		7
Total patients	145	18	62	4	229

*One case with both legs fractured.

TABLE II

TYPE OF INJURY

(Excluding Old Cases)

	Indirect Trauma		Direct Trauma		Totals
	Puncture Wounds	Extensive Damage from Within Out	Lacerations and Cuts	Massive Trauma	
Phalanges and metacarpals			5	49	54
One or both bones of forearm or wrist	25		5	13	43
Humerus	2	2	1	5	10
Scapula			1	1	2
Phalanges and metatarsals			2	14	16
Tarsus		3	1	1	5
One or both bones of leg or ankle	25	14	4	22	65
Patella				2	2
Femur	7	1	1	5	14
Pelvis	2			1	3
Totals	61	20	20	113	214

PHALANGES AND METACARPALS (56 CASES)

There were fifty-four fresh compound wounds and two old wounds. All were due to external violence, usually associated with industrial occupations. Crushing between two objects or in machines, injuries in cutting machines or being struck by heavy weights were common causes.

The majority of patients applied for treatment immediately after the injury, forty-nine within twenty-four hours, and five others two, three and seven days after injury. Two were classified as old cases; these were seen two weeks and four months respectively after injury.

Treatment:

		Sepsis
Dressing with or without antiseptic	7	1
Amputation—left open	1	0
Amputation—closure	12	1
Débridement	14	0
Débridement—closure	14	0
Débridement plus Carrel-Dakin treatment	5	1
Débridement plus amputation plus Carrel-Dakin	1	1
	54	4

Some of these cases are really traumatic amputations, but frequently an attempt was made to save certain fractured phalanges with the removal of others, hence the impracticability of separating these into two groups. It will be noted that there were four septic cases in spite of the treatment given. In two cases without end results we do not know about the sepsis, so that there are four septic cases out of fifty-two or approximately eight per cent. It is of interest to note that there were no cases of tendon sheath infection. Apparently the infection does not travel up a tendon sheath already opened up at its distal end. There were no cases of resulting osteitis. Amputation of one or more phalanges was done primarily fourteen times and secondarily twice. There were no cases of gas bacillus infection or tetanus and no deaths. The average time in the hospital was two weeks.

There were but four patients in this group who did not resume their former work. The amount of disability depended on the extent of the amputation required. The disability in the septic cases was no greater than in those which remained clean.

BONES OF FOREARM (43 cases)

There were forty-three cases in this series with end results in twenty-eight. All were recent cases; thirty-six were treated within twenty-four hours of injury. Two delayed twenty-four hours; one, two days; two, three days; one, four days; and one, five days.

It was impossible to determine from the records which cases had small puncture wounds from indirect trauma and which had larger wounds produced from within out, so all of the indirect trauma cases have been classified as puncture wounds. There are twenty-five cases of puncture wounds, five cases of cuts and lacerations.

Many of the groups contain too few cases to make any deductions as to the value of the treatment. However, it is to be noted that, of the sixteen cases treated by cleansing the wound and leaving it open, fifteen stayed clean. These were the small puncture wounds made by spicules of bone with very little soft tissue damage. There was potential but not much actual soiling of the wound. The wound was not sutured in any of these cases. Sepsis occurred in six per cent of the cases.

The next group was made up of larger, dirtier wounds in which a débridement was done. The operator found little soft tissue damage and thought it safe to close the wound. Sepsis occurred in twenty-nine per cent of these cases.

The next group was débrided and left open with sepsis appearing in one case in four (25%). The final group was débrided and subjected to Carrel-Dakin treatment with sepsis in two out of six cases (33%). The last two groups were obviously the most severe cases.

In eight cases we find that traction was used to accomplish or maintain reduction. The majority of arms were mobilized by plaster casts, or by anterior and posterior splints of wood or plaster. Bone plates were used at secondary operation in five instances, but never in a primary operation. One other secondary open operation was done. Carrel-Dakin tubes were inserted at the primary operation in eight of the cases. The tubes were left in for periods of from four days to four weeks. In but one case

TABLE III

COMPOUND FRACTURES BONES OF FOREARM

Method of Treatment	Puncture Wounds		Cuts and Lacerations		Massive Direct Trauma		Total
	Sepsis	No Sepsis	Sepsis	No Sepsis	Sepsis	No Sepsis	
Wound cleaned with or without closed reduction	1	13	0	1	0	1	16
Débridement and closure with or without reduction	0	6	2	1	2	3	14
Débridement, wound left open	0	2	1	0	0	1	4
Débridement and Carrel-Dakin	0	1	0	0	2	3	6
Closure four days before admission	—	—	—	—	1	0	1
No treatment	—	2*	—	—	—	—	2
Totals	1	22	3	2	5	8	43

*Untreated because of other injuries.

was the degree of infection watched by the use of bacterial smears. In that case smears were made every day until they were negative for organisms.

There were no cases of persistent bone infection, no gas bacillus or tetanus infections and no amputations. There were two deaths, one from fracture of the pelvis occurring two hours after admission and one from sepsis. The latter patient also had a compound fracture of the humerus, and both compound wounds remained infected until his death in nine days. He had been admitted twenty-four hours after being caught in a windlass. Débridement was done and Carrel-Dakin treatment was given. The mortality in the series was two and four-tenths per cent.

The duration of the hospital treatment in forty cases (excluding a case with a fractured femur and the patient dying of a fracture of the pelvis) averaged three and one-half weeks. The longest time was thirteen weeks and the shortest time, three days.

A study of the cases shows three poor results. One patient who developed sepsis had a poor anatomical result, fair function and was able to resume his work after a year. A second, who also had compound fractures of his fingers, developed sepsis and finally had very poor function of the arm and was unable to do much work. A third, who was a watchmaker, developed so much stiffness in his fingers that he could not return to full duty at his trade.

Twelve patients out of twenty-eight in whom the final results are known had practically perfect results. In eight cases there was either some deformity, some limitation of function, or change in the economic status, but the results were considered to be fair.

Comment:

Our experience has been that simple cleansing of a small puncture wound in the arm with the application of iodine to the skin is a safe procedure if there is no gross contamination. The wound should be left wide open and we believe the Carrel-Dakin treatment offers additional protection. Our cases that have had a débridement and closure have shown a much higher percentage of sepsis than those left open. We do not advocate loose closure of the wound or partial closure with drainage; it should either be tightly closed or left open.

HUMERUS (15 CASES)

There were fifteen cases in this series. Of these, ten cases were due to recent injuries and five cases were from old injuries. End results were determined in eight new and three old cases. Of the ten fresh cases, eight were seen in the first twenty-four hours, one a day after injury and one four days after injury. Two were puncture wounds, two were more extensive wounds from within out, one was due to a cut, and five were due to massive direct trauma.

There was one case of gas bacillus infection in a four-day-old wound and immediate amputation was done with recovery. There was one death from sepsis in a day old compound fracture of the humerus associated with a similar wound of the forearm. There were no persisting bone infections. Table V shows the immediate results by the various methods of treatment.

The end result study showed practically a perfect result in twelve out of twenty-eight cases. Besides the death mentioned above there was one death in an untreated case. Eleven cases showed some deformity; five of these had some slight impairment of function but all resumed their former occupations. There were three poor results. The first was in a septic case where there was a full year of disability. He had a poor anatomical result, fair function and was able to do his usual work. The second was in a case with compound fractures of the fingers, wrist and sepsis. He was unable to resume work. The third was in the watchmaker mentioned above who also had compound fractures of the bones of the forearm.

We believe that in compound fractures of the humerus, careful débridement should be done in all cases. Sepsis may mean non-union and must be avoided.

SCAPULA (2 CASES)

There were two minor fractures of the scapula. The compound wounds healed without sepsis after the application of antiseptics. The end result was known in but one case; this patient had a good functional result.

TABLE IV

SUMMARY OF TREATMENT OF BONES OF FOREARM

	Sepsis	No Sepsis	Total	% Sepsis
Wound cleansed	1	15	16	6
Débridement	5	13	18	27
Débridement and Carrel-Dakin	2	4	6	33
Wound closed	4	10	14	29
Wound left open	4	22	26	15

PHALANGES AND METATARSALS (16 CASES)

There were sixteen cases, eleven with final results and five without. All patients applied for immediate treatment but one, who delayed two days. The usual cause was the falling of a heavy weight (eleven cases); one was a crushing injury and in two the causal agent was a bullet or gun-shot charge.

TARSUS (8 CASES)

There were five fresh and three old compound fractures or dislocations of the tarsus in our series. Of the fresh cases, one was due to a bullet wound, two to falls, one to a railroad accident and the other was caused by a heavy weight falling on the foot.

There were no cases of tetanus or gas bacillus infection and no deaths. The average hospital stay was seven weeks. The Carrel-Dakin treatment was not used in any case as a primary measure.

Treatment was as follows:

Débridement and closure	1—no sepsis
Débridement and astragalectomy	2—no sepsis
Débridement and reduction	2—both septic—with secondary amputations

The final results were known in only two cases. One patient had an astragalectomy with fair function and he was able to do about three-fourths of his usual work. Another with a compound dislocation of the astragalus had about half his usual function and had to change his occupation.

TABLE V

COMPOUND FRACTURES OF THE HUMERUS

Method of Treatment	Indirect Violence		Direct Violence		Totals
	Sepsis	No Sepsis	Sepsis	No Sepsis	
Wound cleansed with closed reduction	1			1	2
Débridement and closure		1		2	3
Débridement, wound left open				2	2
Débridement and Carrel-Dakin		1	1		2
Amputation for gas bacillus infection	1				1
Totals	2	2	1	5	10

Carrel-Dakin treatment was used in two cases and in both the wounds remained clean. There were no gas bacillus or tetanus cases, no deaths and no resulting bone infection. The average hospital stay was three and one-half weeks; the longest was eleven weeks and the shortest, one week. Four patients required secondary amputations of one or more phalanges.

The immediate results are shown in table VI. The final results are known in eleven cases. Two were given a perfect rating. Five others had excellent results considering that one or more phalanges had been removed. Two patients were able to do their work and had a good functional result after the amputation of one toe. There were two poor results, one a traumatic amputation of two toes and the other due to a crushing injury of the first metatarsal and proximal phalanx.

TABLE VI

TREATMENT OF PHALANGES AND METATARSALS

	Cases	Sepsis	No Sepsis
Antiseptic dressings	1		1
Cleansing and suturing	2	1	1
Débridement and suturing	3		3
Débridement, open reduction—wound left open	2	1	1
Débridement, open reduction plus Carrel-Dakin	2		2
Débridement and left open	3		3
Amputation toe with closure	2		2
No treatment	1	1	
Totals	16	3	13

Summary: Wounds closed 7—sepsis 1
Wounds left open 8—sepsis 1

The problem of the treatment of compound fractures of these bones is much the same as in the bones of the hand. The degree of the original injury determines the final result to a certain extent. Amputations are frequently necessary to give the best result.

BONES OF LEG (72 CASES)

There were sixty-four recent compound fractures of one or both bones of the leg and eight old cases. End results were obtained in fifty-one of the fresh cases. Fractures extending into the knee joint and fractures of the ankle,—few

in each group—have been grouped with the fractures of the shafts in this study. This group of compound fractures is the largest and perhaps the most important of any in our series.

All but one patient applied for treatment immediately after injury. Automobiles were the cause of injury in forty-two out of sixty-four cases. It is to be noted from the following table that patients with auto injuries fall into all four groups.

Cause of Fractures:

1. Puncture wound (24 cases)
   - Struck by auto 15
   - Auto accident 2
   - Fall 4
   - Crush between trucks 1
   - Struck by train 1
   - Collision of baseball players 1
2. Extensive fractures from within out (14 cases)
   - Caught foot 2
   - Struck by auto 6
   - Fall 5
   - Heavy weight falling 1
3. Lacerations (4 cases)
   - Run over 1
   - Auto accident 1
   - Struck by auto 1
   - Crush 1
4. Massive direct trauma (22 cases)
   - Fall 1
   - Caught between railroad cars 2
   - Crush by heavy weight 4
   - Run over 3
   - Struck by auto 7
   - Auto accident 5

Table VII shows the various methods of treatment with various combinations of (1) cleansing or débridement of the wound, (2) closure or not, (3) skeletal traction and (4) Carrel-Dakin treatment. The groups are too small to be of statistical value. Of twenty cases treated by simple cleansing of the wound or by the application of iodine there were but two cases of infection, but these were the mildest compound cases. Débridement with closure showed four septic cases out of twelve. Débridement with or without Carrel-Dakin treatment was done in forty-four cases with ten cases of sepsis.

However, when we consider the table from the type of fracture we find that nearly all the septic cases came in the group of massive direct violence and that these cases showed forty-seven per cent septic cases. This is a very unsatisfactory result. However, it is to be borne in mind that before the development of the débridement technique many of these limbs would have been considered beyond aid, and amputation would have been considered. The percentage of sepsis in this entire group was eighteen.

Carrel-Dakin treatment was used in twenty cases. There was one case of tetanus in an old case admitted twelve days after injury. This case is discussed later. There were no gas bacillus cases. Three patients developed bone sepsis with later removal of sequestra. One patient had a persistent sinus one year after injury.

TABLE VII

COMPOUND FRACTURES OF BONES OF LEG

Method of Treatment	Puncture Wounds		Extensive Wounds from Within Out		Lacerated Wounds		Extensive Direct Violence		Total
	Sepsis	No Sepsis	Sepsis	No Sepsis	Sepsis	No Sepsis	Sepsis	No Sepsis	
Wound cleansed with or without closed reduction	1	4	0	0		1	1	1	8
Wound cleansed—Steinmann Pin Traction	0	9				1		1	11
Wound cleansed and sutured						1			1
Débridement with closure (closed reduction)		4		1			3	1	9
Débridement with closure—Steinmann Pin Traction				1			1	1	3
Débridement with closed reduction		1		1					2
Débridement with Steinmann Pin Traction		2		2			2	3	9
Débridement and Carrel-Dakin						1		2	3
Débridement and Carrel-Dakin with open reduction		1		1					2
Débridement and Carrel-Dakin with or without open reduction and S. P. Traction		3	2	6			2	2	15
No Treatment							1		1
Totals	1	24	2	12	0	4	10	11	64
	4% septic		14% septic		No sepsis		47% sepsis		

Skeletal traction was used in twenty-nine cases, a Steinmann pin being inserted through the os calcis. Delayed union was noted in one case with skin traction and non-union in three cases in which skeletal traction was used. Non-union occurred, therefore, in ten per cent of the fresh cases with skeletal traction. Bone grafts were done in the three cases of non-union with good results.

Secondary amputation was done five times after an attempt had been made to save the limb and treat the fracture. Three of these were for sepsis, one for poor circulation, and one for secondary hemorrhage in the presence of sepsis.

Sepsis:

Some degree of sepsis was noted in thirteen cases, as follows:

Case 1. Traumatic amputation one leg, fracture b. b. leg and femur on other side. Amputation of second leg for sepsis. Death.

Case 2. Débridement with loose closure. Skeletal traction. Minor sepsis.

Case 3. Multiple fractures—b. b. leg, ulna, clavicle, pelvis. Wounds cleaned. Died of sepsis and pneumonia.

Case 4. Tibia protruding, débridement, Carrel-Dakin treatment, skeletal traction, mild sepsis and later sequestrectomy.

Case 5. Large, direct trauma wound, debrided and left open, skeletal traction, sepsis, secondary hemorrhage and amputation.

Case 6. Fracture from within out, débridement, Carrel-Dakin treatment, sepsis, sequestrectomy.

Case 7. Puncture wound, hit by fire truck. Cleansed and dressed, closed, amputation in ten days for sepsis.

Case 8. Débridement, Carrel-Dakin treatment, skeletal traction. Amputation for sepsis in two weeks.

Case 9. Débridement, closure, sepsis and sequestrectomy.

Case 10. Débridement, skeletal traction, sepsis.

Case 11. Extensive soft tissue maceration, dressing only, extensive sepsis and later extensive débridement.

Case 12. Débridement, skeletal traction, sepsis, bone infection, sinus.

Case 13. Débridement with loose closure, cast, slight skin sepsis.

Deaths:

There were four deaths, as follows (mortality 6.3 per cent):

1. Traumatic amputation one leg, secondary amputation other leg for fractures and sepsis.
2. Multiple fractures. Sepsis and pneumonia.
3. Fractured skull (four days).
4. Uremia following multiple fractures (twelve days).

The average hospital stay (excluding the deaths) was ten weeks. The shortest time was two and a half weeks and the longest (including three admissions) was twenty-eight weeks.

Results:

1. Puncture Wounds (20 cases)
   - 11 cases—practically perfect in every way.
   - 5 cases—economically the result was perfect. Slight deformity and slight disability.
   - 1 case—slight deformity, slight disability functionally, slightly limited at old job.
   - 1 case—amputation for sepsis.
   - 1 case—death from sepsis and pneumonia.
   - 1 case—death from other causes after discharge.

2. Extensive fractures from within out (12 cases)
   - 5 cases—practically perfect.
   - 2 cases—slight deformity but otherwise good.
   - 1 case—delayed union. Function only fair.
   - 1 case—sepsis. Some deformity and function fair.
   - 1 case—delayed union. Considerable deformity.
   - 1 case—death from uremia.
   - 1 case—death from other causes after discharge.

3. Lacerations (3 cases)
   - 2 cases—practically perfect.
   - 1 case—slight deformity and slight limitation of function.

4. Massive Direct Trauma (17 cases)
   - 9 cases—practically perfect.
   - 1 case—satisfactory except for slight deformity by x-ray.
   - 2 cases—fair function, slight deformity, unable to do former work.
   - 3 cases—amputations.
   - 1 case—death from fractured skull.
   - 1 case—death from traumatic amputation of one leg, secondary amputation of other leg.

Comment:

As in the fractures of the bones of the arm, our results show that the mild puncture wounds are satisfactorily treated by cleaning the wound and leaving it open after sterilizing the skin (10 per cent sepsis). It has not been our custom to close these wounds, although it was done successfully in one case.

If the wounds are larger, débridement and exploration of the wound are indicated. We have closed some of these wounds which did not appear dirty and we advocate closure in selected cases. Our results showed thirty-three per cent sepsis when closure was done and nineteen per cent when left open.

In the larger wounds and those caused by direct trauma we advocate débridement and the instillation of Dakin solution according to the Carrel-Dakin technique.

Our results show too many septic cases in the

extensive wounds from direct violence, the most complicated of the compound fractures.

PATELLA (3 CASES)

There were three cases of compound fracture of the patella, two fresh and one old. The first was subjected to débridement and healed without sepsis with a perfect result. The second wound was débrided and the fragments sutured with kangaroo tendon. There was no sepsis but the final result is unknown.

FEMUR (17 CASES)

Fourteen fresh cases and three old cases comprise this series, a total of seventeen. End results were obtained in eleven new and one old case. One patient was admitted three days after treatment, but the others applied for treatment at once.

The cause of injury was fall, eight cases; bullet wound, two cases; automobile or truck accident, four cases. Table VIII indicates the methods of treatment and the immediate result.

There were two cases of bone infection requiring sequestrectomies. There was one case of tetanus with recovery, no cases of gas bacillus infection and one death (mortality 7 per cent). This death was due to sepsis and occurred on the fourth day. One secondary amputation was done for diabetic gangrene of the injured leg.

Case 5. Sepsis after open operation. Amputation for diabetic gangrene.

Results:

There were two of the eleven cases seen at the end of one year in whom the result was practically perfect. There was one death. All of the others were rated as having but fair function, anatomical result or economic efficiency, being deficient in one or more of these groups. All patients were able to continue their old occupations.

Comment:

Compound fractures of the femur are so serious that we feel that radical treatment is the safest. In our series of five cases treated by cleansing and applying antiseptics we were lucky enough to have three wounds stay clean. We believe that these wounds should all have been treated by débridement and all left open. All wounds of any size should receive Carrel-Dakin treatment as well.

PELVIS (3 CASES)

There were three cases in this group. The first case showed a puncture wound of the ilium, associated with a dislocation of the shoulder. The wound was treated with an antiseptic dressing with no sepsis and with an excellent result.

TABLE VIII

COMPOUND FRACTURES FEMUR

	Puncture		Within Out		Lacerations and Cuts		Extensive External Violence		Total
	Sepsis	No Sepsis	Sepsis	No Sepsis	Sepsis	No Sepsis	Sepsis	No Sepsis	
Wound cleansed, Skeletal Traction	2	3							5
Débridement, Skeletal Traction		2							2
Débridement and Carrel-Dakin						1	1		2
Débridement and Carrel-Dakin and Skin Traction								1	1
Débridement and Carrel-Dakin and Skeletal Traction				1			2	1	4
Totals	2	5	0	1	0	1	3	2	14

Excluding the patient who died, the patients spent four months on an average in the hospital. The longest time was eight months and the shortest three and one-half weeks.

Sepsis occurred in five cases (45 per cent). The cases are cited briefly.

Case 1. Puncture wound, treated elsewhere for three days. Dressing only at Massachusetts General Hospital. Sepsis.

Case 2. Fire engine crash, death in four days from sepsis.

Case 3. Bullet wound, sepsis.

Case 4. Gunshot wound, phlebitis, sepsis, tetanus. Recovery.

The second case was one of massive external violence, associated with a compound fracture of both bones of the leg. The wound was débrided and there was no sepsis. The patient died of uremia, not associated with the fracture.

The third patient had a puncture wound which was treated with an antiseptic dressing without sepsis or complications.

GENERAL CONSIDERATIONS

Anesthesia:

The type of anesthetic used is summarized in table IX. Ether seemed to be the favorite.

TABLE IX

ANESTHESIA—EXCLUDING OLD CASES

	Ether	Gas Oxygen or Ethylene	Novocaine	Spinal	None	Total
Phalanges and metacarpals	26	6	16		6	54
One or both bones of forearm or wrist	28	3	1		11	43
Humerus	7	1	1		1	10
Scapula					2	2
Phalanges and metatarsals	10	2	2		2	16
Tarsus	3	2				5
One or both bones of leg or ankle	38	11	9	1	5	64
Patella	2					2
Femur	6	6	2			14
Pelvis			1		2	3
Totals	120	31	32	1	29	213

TABLE X

SUMMARY OF SEPSIS*

	Indirect Trauma Puncture Wounds	Indirect Trauma Extensive Within Out	Direct Trauma Lacerations and Cuts	Direct Trauma Massive Trauma	Totals	Sepsis
Phalanges and metacarpals			5 (0)	49 (4)	54 (4)	8%
One or both bones of forearm or wrist	25 (1)		5 (3)	13 (5)	43 (9)	20%
Humerus	2 (0)	2 (2)	1 (0)	5 (1)	10 (3)	30%
Scapula			1 (0)	1 (0)	2 (0)	0%
Phalanges and metatarsals			2 (0)	14 (3)	16 (3)	18%
Tarsus		3 (1)	1 (0)	1 (1)	5 (2)	40%
One or both bones of leg or ankle	25 (1)	14 (2)	4 (0)	21 (10)	64 (12)	18%
Patella				2 (0)	2 (0)	0%
Femur	7 (2)	1 (0)	1 (0)	5 (3)	14 (5)	35%
Pelvis	2 (0)			1 (0)	3 (0)	0%
Totals	61 (4)	20 (5)	20 (3)	112 (27)	213 (38)	
Per cent septic	6.5	25.	15.	24.	18.	

*Number of septic cases shown in brackets.

Sepsis:

In table X we present a summary of the septic cases. In some of these the amount of sepsis was very mild and did not in any way complicate the result.

Sepsis According to Method of Treatment:

Table XI shows the relative sepsis in the cases treated by antiseptic dressings, and débridement with closure. Those cases treated by the simplest methods, because they were the mildest cases, gave the lowest percentage of sepsis (14). The wounds that were débrided and closed were the ones that the operator thought would stay clean without drainage. They gave sixteen per cent septic results, while the cases débrided and left open showed twenty per cent septic cases.

Bone Plates:

It has not been our practice to use any foreign material for the fixation of fractures which have been compounded, although many of us believe it is a safe procedure in certain cases, provided the wound is left open and Dakinized. One case in this series was so treated. Healing occurred without sepsis.

Mortality:

There were eight deaths in this series. One patient was untreated and died immediately. One died of a simple fracture of the skull, leaving six deaths as a result of compound fractures which were treated. The mortality was two and nine-tenths per cent.

Tetanus Infection:

All cases in this series were given antitetanic serum. As previously stated, one patient developed tetanus on the twenty-fourth day after admission for a gunshot wound of the thigh, femur and knee joint. Because of the initial injection the disease ran a mild course and the patient recovered after receiving 180,000 units of antitetanic serum.

Another patient was admitted twelve days

after receiving a compound fracture of both bones of the leg. Tetanus infection was present on admission. The leg was amputated but the patient died in five days.

The incidence of tetanus in this series of two hundred and seven patients with two hundred and thirteen compound fractures was forty-eight one hundredths per cent.

Osteitis:

There were five cases of persistent bone infection which was an osteitis rather than an osteomyelitis. Sequestrectomy was done in each instance with immediate healing. Three of these were in fractures of both bones of the leg and two in femurs. One other patient in the first group had a persisting sinus at the end of one year. The incidence of osteitis in the entire series was two and nine-tenths per cent.

Gas Bacillus Infection:

No case which received primary treatment for the compound wound developed gas bacillus infection. Gas bacillus prophylactic serum was not used at all in this series.

One boy of ten was admitted with gas bacillus infection four days after injury was incurred by falling from a piazza. No primary débridement was done. The fracture was reduced and put up at a right angle. In spite of an immediate rise in temperature, the apparatus was not removed for four days at which time gas infection was found. On admission to the Massachusetts General Hospital, disarticulation at the shoulder was done and the boy recovered.

There were other gas bacillus infections in the hospital during the period of this report, but they occurred in traumatic amputation cases, where no attempt was made to deal with the fracture.

Carrel-Dakin Treatment:

A study of the cases treated by the Carrel-Dakin treatment shows that this treatment was reserved for the most extensive injuries. For this reason it is unfair to determine the results of the treatment by the percentage of septic cases. The percentage of sepsis is higher than in the cases not so treated.

The technique of the treatment was not carried out accurately in many of these cases. In some instances Carrel-Dakin tubes were inserted in the wound at the time of operation, but the instillation of Dakin solution was not started until sepsis appeared. In other instances the tubes were not introduced into the wound until it became septic. In but one case was the degree of infection checked by careful examination of bacterial smears. For this reason the treatment was frequently discontinued before the infection had cleared up. Numerous cultures were made, but these showed what organism was present and not how many organisms.

TABLE XI

SUMMARY OF TREATMENT AND SEPSIS

	Antiseptic Dressings	Débridement Left Open	Débridement Closed
Phalanges and metacarpals	7 (1)	20 (2)	14 (0)
Bones of forearm	16 (1)	10 (3)	14 (4)
Humerus	2 (1)	4 (1)	3 (0)
Scapula	2 (0)	—	—
Phalanges and metatarsals	3 (1)	11 (1)	3 (0)
Tarsus	—	4 (2)	1 (0)
Bones of leg	20 (2)	32 (6)	12 (4)
Patella	—	1 (0)	1 (0)
Femur	5 (2)	8 (3)	1 (0)
Pelvis	1 (0)	1 (0)	—
Totals	56 (8)	91 (18)	49 (8)
Sepsis	14%	20%	16%
Whole series	18% septic		

Table XII shows the results of the Carrel-Dakin treatment by groups. The largest group in which it was used was in the bones of the leg and the femur. The results were most satisfactory in the bones of the leg. Obviously, the fact that the percentage of sepsis in the Carrel-Dakin cases was higher than in those not so treated is not an argument against its use in the severe cases. Actually, many limbs were saved by its use.

The Technique of Carrel-Dakin Treatment:

In this hospital we have always used Dakin solution, made up by the direct chlorination method described by Dakin. This method is practical only in a large hospital. In smaller hospitals and in a general surgical practice, we have found hychlorite (made by the Bethlehem Laboratories) quite as satisfactory. Indeed, Sherman of Pittsburgh has always used this and he is one of the strongest advocates of the Carrel-Dakin régime.

Dakin solution and hychlorite have properties which kill bacteria in a wound without injuring

the tissues. The primary purpose in using it then is to *sterilize* wounds. *Irrigation* of the discharges from the wounds is also an essential feature. The solution *dissolves pus* and sloughs, changes them to chloramines which are irrigated from the wounds and on to the dressings. It has the power of *stimulating* healing and by its correct use septic wounds can be quickly changed to clean wounds, ideal for secondary suture.

Technique (as described by Carrel):

1. Small rubber tubing made of a special chlorine-resisting rubber is prepared in one foot lengths with a silk ligature about one end and with holes punched at one-quarter inch intervals on four sides for a distance of one or two inches from the end.

2. At the time of operation these tubes are placed in the wound in sufficient quantity to allow thorough irrigation. All the holes in the tube should be in the wound or in case of a surface wound requiring irrigation as well, none of the holes in the wound. The tubes are lined up, sewed to the skin and fastened by adhesive plaster. The tubes should be so placed that puddles are formed in the wounds. At each irrigation the new solution goes to the bottom of the puddle and forces out accumulated débris. The wound is left as widely open as possible.

3. The skin for a considerable distance around the wound is covered by boric ointment compresses made by saturating a fine mesh gauze with ointment. Autoclaving makes the distribution homogeneous throughout the gauze.

4. Cultures and smears are taken with platinum loops from the wound at operation. Smears are then taken every two or three days and stained with methylene blue. The average number of bacteria seen in five high power fields is noted. In the usual septic case the number is more than fifty at first and is noted as "infinity". During the next few days the number will be reduced to perhaps fifteen or ten. When no more than one organism is seen in five fields, the wound is considered sterile. Then, and not till then, the irrigations may be stopped. One organism will give a positive culture, hence cultures are useful only in determining the organism and not the degree of sterility.

5. Small squares of finely woven compress cloth or linen are now laid over the tubes to keep them in place, but they or gauze sponges must never be packed in the wound. Failure to observe this point will result in failure of the Dakin treatment.

6. Fluffed gauze is placed about the wound to absorb the discharges. One pad large enough to completely surround the wound and thick enough to last twenty-four hours is then held in place by a towel or swathe, the latter being pinned rather than bandaged.

7. The best technique calls for a dark colored solution bottle holding 800 to 1000 cc. attached to the bed. This bottle is connected by rubber tubing and glass connecting tubes to each of the smaller tubes in the wound. Every two hours a clamp on the tube is released allowing a measured amount of the solution to flow into the wound. If the bottle is at the proper height and if the skin is properly protected this solution may be given day or night without awakening the patient. However, in this hospital it is impossible to get internes to use the gravity apparatus. Instead, they clamp each tube as it emerges from the dressing and cover it with a sterile sponge. Each of the tubes is then filled separately. This is a serious break in an aseptic technique.

8. Five to fifteen cubic centimeters of the solution is given per tube every two hours. Dakin has demonstrated that bacteria will grow in solution more than two hours old. Frequently we have found patients having the instillations regularly during the day but only once or twice at night, and of course these patients have not done well. The first irrigation should be given before the patient leaves the operating room and not wait until the next day.

9. All parts of the dressing except the tubes must be changed daily. Each tube should be flushed out with a syringe. The skin should

TABLE XII

SEPSIS IN CARREL-DAKIN CASES

		Indirect Trauma	Direct Trauma
Phalanges and metacarpals		—	8 (2)
Bones of forearm		1 (0)	5 (2)
Humerus		1 (1)	1 (0)
Phalanges and metatarsals		—	2 (0)
Bones of leg		13 (2)	7 (2)
Femur		1 (0)	6 (3)
Totals		16 (3)	29 (9)
Summary:	Carrel-Dakin cases	18% septic	31% septic
	Whole series	11% septic	22% septic

be cleansed with neutral soap solution, which in turn should be washed off with salt solution. Irritation of the skin may be relieved by zinc oxide ointment. We see no merit in the use of hydrogen peroxide to cleanse the skin.

10. All material to be used in carrying out this technique and no others should be at the bedside on a cart. Strict asepsis must be used and all material and dressings handled by instruments.

11. A potentially septic wound should be sterile in three or four days. A frankly septic wound should be sterile and ready for a secondary suture or dry dressings in eight to ten days.

12. For large surface wounds it has been found helpful to cover the tubes individually with small pieces of Turkish toweling. This keeps the tubes from moving during the instillation. It keeps the débris from filling the holes in the tubing but it does not interfere with the instillation of the solution. In other cases it is helpful to use a tube attached at both ends to a Y tube with the holes punched in the central part of the tubing.

SUMMARY

1. This series comprises two hundred and thirty-six compound fractures and dislocations occurring in two hundred and twenty-nine patients. Of these, twenty-two were fractures one week or more old. The end results have been studied in one hundred and sixty-three cases.

2. The method of débridement in use at this hospital and the technique of Carrel-Dakin treatment have been described.

3. A study has been made of the amount of sepsis, disability and permanent deformity developing after treatment of compound fractures by various methods.

4. The incidence of tetanus in the series was 0.48 per cent, of gas bacillus infection none, of persistent bone infection 2.9 per cent.

5. Sepsis followed treatment in 18 per cent of the cases. In the mild puncture wounds this was 6.5 per cent, while in the cases caused by direct trauma it was 24 per cent.

CONCLUSIONS

1. If treated early and adequately, the average compound fracture caused by indirect trauma is no more serious than a simple fracture. If sepsis develops, the period of disability is prolonged and the end result is not so good.

2. Our results obtained by cleansing the small puncture wound, applying an antiseptic solution and leaving the wound to granulate have been for the most part satisfactory.

3. Compound fractures from direct trauma are far more serious and call for very radical measures. Thorough débridement of a compound wound with adequate irrigation usually prevents the development of sepsis. We believe that some of the smaller wounds may be tightly closed after débridement but that the larger ones should be left wide open. We do not advocate loose closure or partial closure with drainage.

4. The Carrel-Dakin treatment is a satisfactory method of treating a septic compound wound or in preventing sepsis in a potentially septic wound if the treatment is carried out according to the original published technique.

5. Débridement prevents the development of gas bacillus infection. Gas bacillus serum is not needed as a prophylactic agent.

6. A prophylactic dose of antitetanic serum will usually prevent tetanus, or if tetanus develops, will reduce the severity of the disease.

7. Débridement of the bone ends will usually prevent the death of bone and the resulting formation of sequestra.

8. Our results of treatment by the present methods are quite satisfactory with the exception of the femurs and the bones of the leg. There was too much sepsis in these groups. Radical measures should be used in a larger number of these cases.

DISCUSSION

DR. PHILIP WILSON, Boston, Mass.: I have been much interested by Dr. Daland's paper. He has made a thorough study of a large group of cases and a good deal can be learned from it. In considering the results, however, it is important to bear in mind that the patients have been treated by a number of surgeons of varying experience and skill, and that in consequence techniques have differed, and the results from different methods of treatment have not been uniform.

In treating compound fractures several questions arise that require nice judgment. First is the time interval between injury and treatment. When the patients reach the hospital soon after injury we know there is a very reasonable chance of being able to mechanically disinfect the wound by the operation of débridement. What is the time interval before this method becomes impractical and what should we do when the patients reach us in the doubtful period? When they are brought in within the first ten hours I believe there is a reasonable chance of success from débridement; after ten hours the surgeon should decide upon one of two courses, either assume that the wound is clean and protect it with proper dressings, or open it widely on the theory that it is already infected and that the bacteria are too widely disseminated to be influenced by débridement.

A second question demanding good judgment arises in connection with the treatment of the cases with small puncture wounds. We have proceeded on the basis of leaving alone those in which the opening was so small that we didn't believe the end of the bone could actually have protruded, where it simply came to the skin, made an opening, and withdrew again. Where the wound was large enough to have permitted the bone to come out we have performed débridement.

You will notice that in Doctor Daland's series there were no instances where the Orr method of treatment was employed. This is partly due to the fact that the study covered the period from 1923 to 1929 before there was much discussion of this method, and also because we have not been very enthusiastic about this method. Perhaps we shall become so in the course of time. Then, too, there were very few cases in this group in which immediate plating was done. I think we are now find-

ing this a very useful method in certain types of compound fractures. One can perform a débridement, apply a steel bone plate, leave the wound open, and splint the fracture, and the presence of the plate has no influence upon the development of infection, nor does it interfere with healing. The plate maintains the reduction, and granulation tissue may grow out and cover it, or if not, the plate may be removed when consolidation becomes sufficiently advanced.

Finally, a word of warning must be said against the injudicious removal of loose bone fragments. I shall always remember a woman with a compound fracture of both bones of the leg who was treated by a young surgeon and a débridement performed. When I first saw this patient there was a considerable gap between the fragments of the tibia with loss of bone substance. The surgeon said that a bone fragment was loose, devoid of blood supply, and there was nothing to do but remove it. The patient made a good recovery and never developed any infection; the wound healed by granulation, but there was no union for three years. Three bone grafting operations were performed before success was obtained in bridging the gap and obtaining union. The lesson is obvious. It would have been far better to have retained the loose fragment to serve as a scaffolding for new bone formation even at the cost of a localized infection. We could have dealt with such an infection far more successfully than we did with the final pseudarthrosis.

Dr. Frederic Jay Cotton, Boston, Mass.: I should like to add a word to that. It seems to me that we are getting around to a point where we begin to know something about handling the compound fractures and the results have been getting a good deal better in recent years, but I stepped down here to focus on one thing. It seems to me the results in fractures by direct violence of both bones of the lower leg present the field in which we should work, and I think the results so far are pretty bad, not only in this series but in general, and in general they are a great deal worse than they are at the Massachusetts General Hospital.

It seems pretty clear not only from what Dr. Daland said today but from what we have heard for several years past that the débridement and leaving open of the case doesn't work very well. Dakin's treatment, yes, as it is carried on in Pennsylvania, but in all these cases that I know, except the Massachusetts General Hospital, it is rather sketchy and inadequate. Dakin's treatment has to be perfect or it is worthless.

I want to put in a plea for the attempt to close in these cases. In the first place, a great many of these cases have ragged wounds and the reason they are not closed is that the wound won't come together. May I say a word in favor of doing plastics to bring them together? You can take a long slash up one or both sides of the wound, quite away from the wound and bring the edges together, closing tightly enough so that there is no air exposure.

In default of the ability to close, it seems to me the Dakin treatment hasn't justified itself very well, and I wonder if we are not coming over to protection with grease, which is nothing radical, simply protecting the surface and giving a chance for cicatrization under a vaseline layer protecting from air-drying and infection, and unnecessary pockets which will breed infection. This is along a line which we have not done enough of in this country.

We should be able to get better results in the particular cases of lower leg fractures and those are the ones in which we get our calamities.

Dr. Peirce H. Leavitt, Brockton, Mass.: It appeared to me when Dr. Daland was reading the paper, that he was reporting cases from a large hospital where possibly most of the work was done by the house doctors. I think it would be interesting if a series of private cases of the regular visiting staff could be recorded as a method of comparison. Possibly there may not be enough to compare with this series, but cases could be collected from members of the staff looking after their own compound fractures, and probably giving a little more careful attention than would be possible by a house doctor.

Dr. Peer P. Johnson, Beverly, Mass.: I should like to say a word in connection with what Dr. Wilson said about bone fragment removal. He has touched on an important point, the tendency to remove too many bone fragments, and I should like to mention a case I saw some years ago of a boy about nine years old who was run into by an automobile. He had compound fracture of both bones of the leg, the skin wound extending from just below the tibial tubercle to the ankle, and the middle third of his leg was entirely broken into three fragments, completely detached and loose outside of the wound.

It was a question of either amputation or replacing those fragments. I washed them off with salt solution and tied them together in bundles and replaced them between the ends of the bones. It took me about two years to get the final end result and I got a result which was perfect. Although he finally ejected most of the fragments there was reformation of bone without shortening. It was a striking example of what nature will do if you give it a chance.

Dr. W. J. Mixter, Boston, Mass.: This is a little far from my particular line but I think that the question of the value of a bone fragment is of distinct interest.

There was one patient I operated on a good many years ago for pituitary tumor. He was operated on by the older technique in which the whole supra-orbital ridge and part of the frontal bone was taken out, with the idea of replacing it afterwards. It was taken out and placed on the table, wrapped up in a sterile sponge. At the end of the operation the supra-orbital ridge was found to have been thrown in the bucket, by the nurse. It was rather an appalling situation and I was a bit stuck; however, we boiled it up in the instrument boiler for two minutes and put it back. He had no sepsis whatever, and the boiled bone united perfectly well. This is simply an illustration of what bone will do even when it is badly insulted.

Dr. Ernest M. Daland: I let the figures, 47 per cent sepsis in the bones of the lower leg, go without much defense. In my paper I have gone into much more detail as to actual cases and I think you will find results aren't quite so bad as they look because, as I say, one drop of pus in a stitch-hole has been classified as a septic case even though the result may have been perfect. Some of those cases obviously should have been amputated but a too enthusiastic house officer or visiting man Dakinized them and attempted to get away with it, but it was attempting too much in some cases.

Speaking of plating the fractures, there was but one case in the entire series that had a plate in a compound wound and that patient did perfectly well. We have had a number of cases during the last two years not included in the series.

LEUKOPLAKIA BUCCALIS AND KERATOSIS LABIALIS*

BY SOMERS H. STURGIS, M.D.,† AND CHARLES C. LUND, M.D.†

ETIOLOGY

ALMOST twenty years ago Levy[1] wrote that "the interest in the study of leukoplakia lies in the fact that the essentials leading to a practical understanding of the subject have been for many years, and still are, unsettled". Schwimmer[22] in 1877 was the first to describe the condition under its present name. During the first decade of the twentieth century the French writers Darier, Gaucher, Bonnett, Montpelier and others concentrated their attention on syphilis as the principal cause. Although the latter two doubted the exclusive etiological rôle of a specific infection, most French authors agreed with Landouzy[2] that "the important, determining factor is syphilis,—for syphilis, if carefully searched for, can be verified in the majority of leukoplakias". Kyrle[3] of Vienna believed that ninety per cent of patients with leukoplakia would be found to have syphilis. However, the prevalence of the descriptive term "smoker's patch" before 1900 shows that tobacco was also recognized as an important contributing factor, and Bettman[7] stated in 1932 "I have never seen leukoplakia in a patient who has not used tobacco".

Other etiological factors of possible importance have appeared in recent years in the literature. In 1927, Fitzwilliams[8] reported the first case of leukoplakia of the tongue caused by an electric current, and mentioned the galvanic action of adjacent dissimilar metal fillings in the teeth as a possible cause in other cases. Beecher[9] in 1928 raised the interesting question of the rôle of food allergy by reporting two cases with chronic leukoplakia who were cured by the removal of certain articles from their diet to which these patients were found sensitive. Others have claimed that hyperacidity of the saliva might constitute an irritating factor of importance over a long period of time. Although no report on the pH of saliva of patients with leukoplakia has appeared in the literature, Sharp[10] nevertheless showed in a series of cases with non-ulcerated malignant lesions of the mouth no variation from the normal salivary pH. It is reasonable to conclude that if this is true of these malignant lesions, it is probably equally true of so-called premalignant lesions of the buccal mucosa. King and Hamilton[11], publishing observations on eighty cases in 1931, called attention to the fact that, like some other diseases, leukoplakia seemed to progress faster in diabetic patients. Bloodgood[4, 5, 6] repeatedly stressed the rôle both of jagged, rough teeth and of chronic infection in dirty mouths, concluding that the irritation from these causes together with that from tobacco explained the etiology of the disease. Concerning bacterial action alone, as in chronic gingivitis or Vincent's infection, James[13] is quoted by Fox[14] as saying "I have found no other cause than dental infection" for leukoplakia. In this connection, Hollander et al.[16] remark that leukoplakia is also found in the esophagus, vagina, kidney pelvis and bladder mucosa which can hardly be attributed to tobacco, galvanic currents, rough teeth, etc., and in these cases—when the absence of syphilis is proved—the irritation of the mucous membrane from low-grade sepsis alone appears to be the cause. Lain[12] emphasized the importance of mechanical irritation from ill-fitting dentures as an etiological factor, and showed also that the presence of mercury sulphide and sulphur in overcolored or undercured Vulcanite dental plates may cause chemical irritation of the mucosa. He further pointed out that improperly vulcanized plates may be of sufficient porosity to allow a deposit of food particles which then become a chronic source of bacterial fermentation. The work of McCarrison and Guerin (both quoted by Orr[29]), tends to show that epithelial tissue responds characteristically with keratinization, round-cell infiltration, etc., to a deficiency of vitamin A. Orr, reporting oral cancer cases among the Indian betel-nut chewers, correlates the low vitamin diet of the Travancore coolies with the high per cent of oral cancer confined to this district and Geschickter[17] has recently suggested that the same deficiency might be the underlying factor in many cases of leukoplakia of the mouth.

Thus, in summary, the following are the more important factors that have been suggested as the sole or participating cause in production of leukoplakia of the mouth at one time or another: syphilis; tobacco; chronic infection; mechanical or chemical irritation from rough teeth, ill-fitting, or poorly made dentures; electro-galvanic currents; vitamin A lack; food allergy and hyperacidity. The essentials leading to an understanding of this disease would appear to be as unsettled as when Levy wrote his article in 1915.

Concerning the etiology of cancer, however, both Lund[19] and Warren and Gates[18] have presented evidence of a systemic factor in this disease. Although they all concede the importance in many cases of a local, irritating factor, they have recently proved that there may also

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be "a predisposition or susceptibility to cancer in certain persons, or the action of some factor favoring the development of malignancy, the nature of which is unknown"[18]. Likewise, as suggested by Hollander[16], an understanding of leukoplakia may eventually recognize the same two categories of important factors,—systemic and local. The systemic factors might include (1) syphilis; (2) vitamin A lack; (3) hereditary predisposition to atrophic and degenerative change closely allied to a possible cancer susceptibility; and local factors might include (1) tobacco; (2) chronic infection; (3) bad dental status; (4) electric currents. It is certainly true that the presence of any one of these factors even in excess does not necessarily bring about the development of leukoplakia. Perhaps one of the secondary, irritative factors in the presence of one of the primary, systemic factors may explain the etiology of the disease in a majority of cases. Unfortunately, we have no method to test for vitamin A lack or for cancer susceptibility. Persistence of the premalignant lesion in the absence of syphilis or any of the secondary local factors listed above is the best indication that we have of the presence of one of these primary, systemic causes. Such persistent leukoplakias may be looked on, as in Levy's concluding words, "as a warning" of malignant disease.

CLINICAL STUDY

For a clinical description of leukoplakia of the oral mucosa, the article on this subject by Hollander, Permar and Shonfield[16] gives an excellent and detailed review of the subjective and objective symptoms, the pathology, and the differential diagnosis of this disease. The following conditions should be considered in making such a diagnosis: (1) Lichen Planus. (2) Syphilis—both the mucous patches of the secondary form and the sclerosing glossitis of the tertiary form. (3) Aphthous Stomatitis, Thrush and Vincent's Infection. (4) Lupus Erythematosus. (4) Glossitis Migrans.

Keratosis of the lip—a closely allied condition—is a dry, crusted, superficial lesion, generally well-defined, but at times with no definite border, so that adjacent areas may be so confluent as to involve the entire lip. In depth it varies from a thin milky or greyish film spreading over the lip and resembling a leukoplakia that has become dried and slightly crusted through exposure, to a thick, horny lesion elevated by the progressive heaping up of the stratum corneum to one or two millimeters. These hard, inelastic lesions are apt to fissure and ulcerate and the differentiation from early epidermoid carcinoma becomes clinically difficult. Lesions on the lip are found in frequent association with keratoses on the face, neck and other exposed parts; not rarely lesions are situated at the mucocutaneous junction, but for the most part they are confined within the vermilion border. The lower lip appears to be more frequently affected than the upper lip. In the differential diagnosis the following should be borne in mind: (1) Herpes Simplex; (2) Syphilis — the primary sore, the secondary mucous patches and the tertiary atrophic changes; (3) Lupus Vulgaris and Erythematosus and (4) Chapping and cracking of the lips following exposure to cold and associated at times with the habit of moistening the lips.

The characteristic features of keratosis of the lip are as follows: (1) appearance at or after middle life; (2) chronicity of the lesion; (3) dryness and crusting of the lesion unless cracks and ulcerations have already appeared; (4) confinement to the mucous membrane of the lips —rarely confluent with lesions over the cheeks or chin.

MATERIAL

This study is based on the records of five hundred and twenty patients who entered the Collis P. Huntington Memorial Hospital clinic between 1918-1926 with leukoplakia or keratosis of the mouth or lips. Keratosis of the lips was included as well as leukoplakia of the mouth or lips since both lesions are so frequently encountered together with the same etiological factors at work and often so confluent that differentiation becomes difficult. One hundred and forty-two of these patients entered between 1918-1921 and three hundred and seventy-eight between 1921-1926. It is probable that a number of cases seen at the clinic for oral cancer during the first three years were not carefully examined for leukoplakia, since Simmons[30, 31] finds the recorded incidence of leukoplakia in cancer cases at that time to be only fourteen per cent, whereas in the next three years, 1921-1923, when a more thorough examination of the buccal mucosa was instituted, he finds the incidence in a similar group of cases to be twenty-five per cent. The records were first codified and recorded on punch cards according to a system outlined by Lund[20] in a previous report. The cards were then divided into groups relative to the development of cancer (see table I). Of these five hundred and twenty cases, two hundred and twenty-two had evidence of cancer be-

TABLE I

DEVELOPMENT OF CANCER

I.	Cancer before or at entry		222
	A. One cancer only	210	
	B. Two cancers, one after entry	12	
II.	No cancer before entry		298
	A. No cancer to end of observation	261	
	B. Cancer after entry	37	
			520

fore, or at the time of admittance. Two hundred and ninety-eight patients entered the clinic with no evidence of cancer on or before entry; two hundred and sixty-one or eighty-eight per cent of these did not develop cancer, while thirty-seven or twelve per cent did develop malignancy during the period of observation.

INCIDENCE OF CANCER

The incidence of cancer in leukoplakia of the mouth was said by Mantilla (quoted,[14]) to be about thirty-two per cent in a total of five hundred and sixty-six cases collected from the literature up to 1901. King and Hamilton[11] report six per cent in their series of eighty cases, but include another thirty-two per cent in a group of "definitely precancerous lesions". In the present study twelve per cent of the group of two hundred and ninety-eight patients who had no malignancy before or at entry later developed cancer. This incidence does not necessarily prove that leukoplakia and keratosis are premalignant lesions. To prove the latter, it is necessary to know the incidence of cancer in a group of normal individuals of similar age and under observation for a similar period of time. This calculation has been made by using tables previously published by Lund[19] and based on the Massachusetts Death Rates for males during the years 1920-1930. It is possible to determine by these tables the numbers of deaths from intercurrent disease, from intercurrent cancer, and from intercurrent buccal cancer that should occur on the basis of chance alone.

In table II are grouped the forty-nine cases in the present series that developed cancer after entry according to location of the cancer. Twelve cases developed double malignancy, the first of which occurred before entry to the clinic. These were disregarded in making the calculations. The details of the remaining thirty-seven cases are given in tables XIV, XV, XVI, XVII and XVIII which may be found at the end of this report.

TABLE II

DISTRIBUTION OF CANCER AFTER ENTRY—49 CASES

I. Two cancers, one before entry		12
II. Cancer after entry only		37
	Cases	Cancer Deaths
One buccal cancer (see table XIV)	21	10
Two buccal cancers (see table XV)	4	2
Skin cancer only (see table XVI)	3	0
One non-buccal cancer (see table XVII)	7	7
Two cancers, one non-buccal (see table XVIII)	2	1

In table III the deaths calculated from the death rates for a control group are contrasted with the deaths in the series of cases under study. It is seen that fifty-three deaths from intercurrent disease other than cancer may be predicted in a group of two hundred and ninety-eight normal individuals in circumstances similar to those of the two hundred and ninety-eight patients studied. Actually there were fifty-nine non-cancer deaths. By calculation, there should have been one buccal cancer death and nine deaths from cancer in other organs. Actually, there were twelve buccal and eight other cancer deaths in the group of cases under study.

TABLE III

LEUKOPLAKIA AND KERATOSIS

Expectancy of Cancer in 298 Cases

	Non-Cancer Deaths	Buccal Cancer Cases	Buccal Cancer Deaths	Other Cancer Cases	Other Cancer Deaths
Calculated	53		1		9
Actual	59	25	12	12	8

The methods of calculation used here are not absolutely accurate. In every step, however, a conservative position was taken, so that the resulting ratios probably underestimate rather than overestimate the difference between the calculated and the actual development of cancer. Nevertheless, the above figures clearly demonstrate that patients with leukoplakia or keratosis of the mouth or lip develop buccal cancer at least twelve times more frequently than chance alone would predict. The term "premalignant" may justifiably be used, therefore, to describe these conditions. In this series, however, patients with these premalignant lesions appear to run no greater risk of cancer in some other organ than individuals without such lesions.

The total series of five hundred and twenty cases was analyzed to determine the significance of age and sex, and of the three more important etiological factors—tobacco, teeth and syphilis. The end-results of treatment in the two hundred and ninety-eight cases that showed no evidence of cancer at or before entry were then studied in relation to location, duration and extent of the premalignant lesion.

AGE

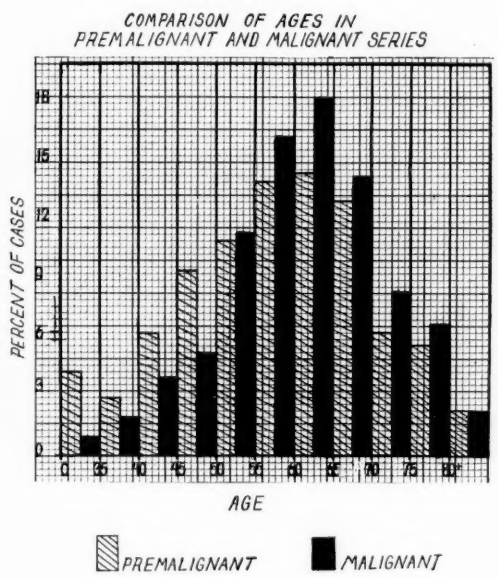
Leukoplakia and keratosis are diseases of late middle life, with thirty per cent of the cases in this series coming between fifty-five and sixty-five, and the average age being fifty-seven and one-half years. Chart I shows graphically the age of the five hundred and twenty cases divided into five year columns and recorded by per cent. In this chart, a series of eleven hundred and thirty-one patients entering the hospital with cancer of the mouth are similarly divided for

comparison. The curves of the two groups are closely parallel, with the premalignant cases showing a little more tendency to fall in the younger age divisions. The average age of the malignant patients was sixty and seven-tenths years.

SEX

Ninety-one per cent of the patients were males. Other authors[11, 14] confirm the preponderance of men with leukoplakia of the mouth. A similar proportion of patients with cancer of

CHART 1.



the mouth are found to be males. In his interesting comparison of cancer of the mouth in the two sexes, Taylor[21] emphasizes the etiological importance of tobacco, teeth and syphilis in relation to the incidence of these factors in each sex. Disregarding cigarette smoking as probably innocuous to the buccal mucosa, and referring to cigars, pipes and the chewing habit only, "the almost universal use of tobacco among men" he says, "may account in large measure for the greater incidence of cancer of the mouth in men than in women". Although bad teeth are a conspicuous etiological factor for both sexes, "men cling to bad teeth longer than women, while the latter provide themselves much more often with dental plates after earlier extraction". In conclusion, Taylor finds syphilis to be a less conspicuous etiological factor in the female group than in the male group of lingual cancer cases.

Similar statements concerning the different incidence in men and women of the tobacco habit, bad teeth, and syphilis, probably pertain to premalignant disease of the mouth, and explain why, in the present series of five hundred and twenty cases, four hundred and seventy-three were men.

TOBACCO

Almost all authors agree in finding the use of tobacco in from eighty to ninety-five per cent of their patients. Of the four hundred and twenty-one reports on tobacco in the records of the group under study, ninety-four per cent used tobacco in some form (table IV). Concerning

TABLE IV

	Tobacco		No Tobacco	
	Cases	Per Cent	Cases	Per Cent
Leukoplakia	244	96	10	4
Keratosis	150	90	17	10
	394	94	27	6

the type of tobacco used, there were only one hundred and ninety-five records that contained sufficient data for tabulation. The use of cigars or cigarettes and the habit of snuff-chewing are recorded so infrequently that they have been disregarded. In the remaining cases, it is interesting (see table V) that among the leukoplakias

TABLE V

TYPE OF TOBACCO IN USE—195 CASES

	Pipe	Chewing Tobacco
Leukoplakia	12%	36%
Keratosis	31%	19%

the ratio of pipe to chewing tobacco in use is one to three while among the keratoses this ratio is almost reversed.

This tends to confirm Taylor's statistics which show a localization of the buccal lesion in relation to those areas of mucous membrane most constantly exposed to the irritation of tobacco. Keratotic lesions, confined to the lips in these cases, were associated with pipe-smoking almost twice as often as with tobacco-chewing. Leukoplakias, however, only twenty per cent of which were located on the lips, were found associated with tobacco-chewing three times as often as with pipe-smoking.

TEETH AND DENTURES

As a corollary to the statement that tobacco, bad teeth and syphilis are the three most important etiological factors, it may be added that leukoplakia and keratosis are diseases of the poorer classes. Perhaps the most conspicuous class difference will be found in the care of the teeth. Bloodgood[4], Hazen and Eichenlaub[22] and many others have emphasized the importance of such care. In an analysis of the dental status of the cases under study, it may be assumed "that edentulous patients had periods of more or less protracted caries and pyorrhea before submitting to total extraction,"[21] and such cases may be included with the group showing bad teeth at entry, for they have already under-

gone long exposure to dental trauma and infection. Concerning plates and dentures, these must fit accurately in order not to irritate the mucous membrane; frequent adjustment is therefore necessary. They must be of non-irritating material; Lain[12] has shown the results of cheap or poorly made dentures. They must also be kept clean. Frequent adjustment and plates made of high-grade material are not generally within the means of the clinic patient; cleanliness is often at a premium. It is not unreasonable, therefore, to include those cases that had plates or bridge-work on entry as well as their premalignant lesion of the oral mucosa, among the group having "bad dental status".

In this series, there were two hundred and fifty reports on the condition of the teeth. These have been summed up in table VI. Since there is a record of the dental condition of only one-half of the total of five hundred and twenty cases, and since it is probable that clean mouths were not recorded so often as dirty mouths,

TABLE VI

DENTAL STATUS IN 250 CASES

		Leukoplakia		Keratosis	
		Cases	Per Cent	Cases	Per Cent
Bad:	No teeth	61	30	6	14
	Bad teeth	83	40	26	60
	Plates or bridge-work	48	22	6	14
	Total	192	92%	38	88%
Good:		15	7	5	11

the percentage given above for those with bad dental condition is undoubtedly high; especially is this true of keratosis of the lip. However, at least sixty per cent of the total number of patients with leukoplakia — one hundred and ninety-two out of a total of three hundred and twelve—may be assumed to have suffered from bad dental hygiene.

Solomon and Reinhard[24], working at the New York State Institute for Malignant Disease, Buffalo, N. Y., have recently reviewed the literature on galvanic currents produced by dissimilar metals used in fillings, plates and other bridge-work. The work of Palmer in 1876, and of Chase and Grant (all quoted by [24]) shows that the soft tissue response to these currents was being carefully considered at the time when the study of leukoplakia was just beginning. Indeed, the latter wrote that "there are many who carry (amalgam fillings) with impunity because of their lack of susceptibility, and no man can tell before trial who can and who cannot bear them". Recently Ewing[27] has recognized the soft tissue irritation "from electrical discharges from dental plates" as a possible factor, with other oral irritation, in the etiology of cancer in the mouth, and in the work of Fitzwilliams[8], Fraser[25], Ullmann[26], and Hollander[15] there is presented further evidence of the presence of such a current wherever even minute quantities of dissimilar metals are used in the mouth. This current is not found in mouths in which only fillings of the same electrical potential are used. In three hundred consecutive cases of dissimilar metallic dentures, Lain[28] has reported leukoplakia adjacent to the dentures in twenty-one per cent, and "either subjective or objective electro-galvanic phenomena" in seventy-one per cent. Solomon and Reinhard conclude, however: "Observation shows that most mouths apparently tolerate such action without ill effect. In practical interpretation of the relationship of galvanic action to production of oral lesions, we must stress the scarcity of objective and subjective symptoms in view of the large number of restorations present in most mouths." No work was done on such galvanic action in this clinic during the years 1918-1926 which include the cases herein reported.

SYPHILIS

In the literature on leukoplakia the apparent tendency has been to view as of less and less importance the etiological significance of syphilis. Thus Fournier (quoted by Bettman[7]) had reported eighty per cent lueties among three hundred and twenty-five cases with leukoplakia; Max Joseph (same) found thirty-five per cent in one hundred cases. In 1922, Hazen and Eichenlaub[22] excluded syphilis in all but thirty per cent of their patients, and King and Hamilton[11], reporting eighty cases of leukoplakia in 1931, found but ten per cent syphilitic and concluded that it played "a minor rôle, in that all of this group had bad teeth and smoked excessively". Elliott and Stookey[3], however, considered "the presence or absence of leukoplakia involving the entire mucous membrane" a valuable piece of evidence in the diagnosis of neurosyphilis. They found but one normal buccal mucosa in fifty neurosyphilitics.

In this series, there were sixty patients in whom a positive Wassermann reaction or definite past history of infection made the diagnosis certain: fifty-five or seventeen per cent of the leukoplakias, and five or two per cent of the keratoses. Wassermann reactions, however, were done at this time only on the suspicious cases in this clinic—two hundred and forty-two of them; thus out of two hundred and forty-two tested cases, the leukoplakia patients show twenty-seven per cent positive reactions and the keratoses thirteen per cent. It may properly be concluded that syphilis is of minor importance in the etiology of keratosis of the lip. The true per cent for leukoplakias irrespective of location, probably lies between seventeen and twenty-seven per cent for this series (table VII).

In their studies of syphilis in cancer of the mouth, Fraser[25] and Lund[23] have presented evidence that syphilis was an important etiological factor in cancer of the tongue alone. Similarly, syphilis is found to be etiologically significant only in leukoplakia of the tongue—as mentioned in a report by Goodale[32] in 1900. Among the leukoplakias that did not develop cancer (see table VIII), sixteen per cent of the tongue lesions showed evidence of syphilis. In the group of leukoplakia patients that did develop cancer at some stage of their disease (table IX), forty-eight per cent of the tongue cases had syphilis.

TABLE VII

INCIDENCE OF SYPHILIS

	Total	Evidence Lues		Total Wassermanns	Evidence Lues	
Leukoplakia	312	55	17%	204	55	27%
Keratosis	208	5	2%	38	5	13%
Total	520	60		242	60	

TABLE VIII

SYPHILIS IN CASES OF LEUKOPLAKIA THAT DID NOT DEVELOP CANCER

Location of Leukoplakia	Total Cases	Evidence of Syphilis	
		% of Total Cases	% of Tested Cases
Tongue	25	16%	24%
Rest of mouth	51	6	13
Lips	19	5	12
Whole mouth	7	0	0

TABLE IX

SYPHILIS IN CASES OF LEUKOPLAKIA THAT DID DEVELOP CANCER BEFORE, DURING, OR AFTER ENTRY

Location of Leukoplakia	Total Cases	Evidence of Syphilis	
		% of Total Cases	% of Tested Cases
Tongue	45	48%	57%
Rest of mouth	93	5	7
Lips	43	9	18
Whole mouth	26	24	28

In this cancer group, leukoplakia lesions involving the mucous membrane of almost the whole mouth also showed a high percentage of luetics. Bloodgood[4] has reported thirteen per cent positive Wassermann reactions in all lesions of the tongue—both benign and malignant—as compared with three per cent positives in all other lesions of mouth.

The present study confirms previous work that syphilis plays an important rôle in the etiology of leukoplakia of the tongue, and further that it is found three times as often in those tongue lesions that developed cancer as in those that never developed cancer. It is probable that the reason for the contradictory estimates of the incidence of syphilis in the literature on leukoplakia may be due to the fact that the location of the lesion was not taken into account. There were only fifteen syphilitic patients among the cases showing no cancer at entry. All of these received specific treatment and only one later developed cancer. This does not prove, however, that antiluetic treatment given after the leukoplakia has developed is of use in the prevention of cancer in these cases. The series is too small.

END-RESULTS OF TREATMENT

For the study of end-results, the material included only those cases that had no oral cancer either before or at the time of their entry, and that were kept under observation for five years or more. The two hundred and forty-eight cases that made up this group were divided into three classes as follows: (1) The cures, one hundred and fifty-eight or sixty-three per cent;—those that responded to treatment and did not recur within five years. (2) The persistent cases, sixty-five or twenty-six per cent;—those that were never relieved as well as those that responded but recurred within five years. (3) The cancer cases, twenty-five or ten per cent;—those that developed malignancy in or contiguous to their premalignant lesion during the period of observation. These cases were studied according to the location, duration and extent of the original lesion. Unfortunately the subdivisions resulting from such a study contained very small numbers of cases, far too small in many instances to be valuable from a statistical point of view. The results may serve to indicate to a certain extent, however, the relative importance of the factors under consideration.

During the years 1918-1926, a small number of cases were given no treatment other than an attempt to institute a hygienic régime, which included the cessation of all use of tobacco, extraction or smoothing down of rough teeth, the establishment and maintenance of oral cleanliness, and adjustment of dentures. A majority of the cases, however, were treated on entry to the clinic with radium unless they were clinically suggestive of malignancy. On the borderline cases, an operative procedure—either electrocoagulation, diathermy or surgical excision—was used alone, or followed by radiation. Other cases in which both operation and radiation were used represent surgical attempts to salvage unsatisfactory radiation results.

Table X shows end results in relation to treatment received. Forty per cent of the small group placed only on a hygienic régime were cured. The results from operation or radiation alone for both leukoplakia and keratosis were roughly comparable. The poorer results in the group requiring both operation and radiation may be ascribed to the persistence, or suggestive malignancy of these lesions rather than to the more vigorous treatment received.

In comparing end results of the leukoplakia group with the results of the keratoses obtained by the different methods of treatment, there is a significant difference only in the group of one hundred and eighty-two patients treated with radiation. Under this treatment, seventy-five per cent of the keratotic lesions were cured, while only forty-two per cent of the leukoplakias responded without recurrence within five years.

TABLE X

FIVE-YEAR RESULTS OF TREATMENT

LEUKOPLAKIA AND KERATOSIS—248 CASES

Treatment	Total Cases	Lesion "Cured"	Persisted	Developed Cancer
Hygienic Régime	20	40%	60%	0%
Operation	24	79	13	8
Radiation	182	69	24	7
Both	22	54	26	20

LOCATION AND END RESULTS

The location of the premalignant lesion was studied in its bearing on the end results, irrespective of the treatment received. The fact that a syphilitic basis for leukoplakia is frequently found in tongue cases (table VI) leads one to expect that the end-results from tongue lesions would be poorer than the others. That this does not appear to be so (table XI) may easily be due to the statistical inaccuracy of conclusions based on such small numbers of cases. This table shows a surprising uniformity of end-results in relation to the location of the leukoplakia lesions.

TABLE XI

FIVE-YEAR RESULTS IN RELATION TO LOCATION—248 CASES

Location	Total Cases	Lesion "Cured"	Persisted	Developed Cancer
*Leukoplakia				
Tongue	28	56%	33%	10%
Mouth	25	53	34	13
Lips	52	51	32	16
Total	105	53%	33%	13%
Keratosis				
Lips	143	75%	16%	8%

*All cases with both leukoplakia and keratosis included with leukoplakia.

DURATION AND END RESULTS

Leukoplakia and keratosis are typically lesions of great chronicity. Fox[14], for instance, gives an average duration of eight and seven-tenths years. It is difficult accurately to gauge the duration of the disease from the records because of the indefiniteness of onset of subjective symptoms. However, in order to ascertain the relation of duration of the condition before treatment in the clinic to end-results, the cases have been divided into five duration periods on the face value of the patient's story, viz., (1) Under three months' duration. (2) Three months to one year. (3) One to two years. (4) Two to five years. (5) Over five years. The cases falling into each duration period have been recorded according to the per cent found in the cured group, the persistent group and the cancer group. (See table XII.) There is found no correlation between the end-results and the chronicity of the lesion before entry to the clinic; in the persistent group only there is found to be an increase in per cent of cases in the longer duration periods. Of the two hundred and thirty-five records available for this study, one hundred and eighty-seven or eighty per cent gave a story of under two years' duration from the onset of subjective or objective symptoms to the first treatment in this hospital, the average for the whole group being one and one-half years.

TABLE XII

FIVE-YEAR RESULTS IN RELATION TO DURATION BEFORE TREATMENT

LEUKOPLAKIA AND KERATOSIS—235 CASES

Duration	Total Cases	Lesion "Cured"	Persisted	Developed Cancer
Under 3 mos.	51	60%	21%	19%
3-12 mos.	104	77	25	7
1-2 yrs.	32	70	15	15
2-5 yrs.	27	52	37	11
Over 5 yrs.	21	67	39	4

EXTENT OF LESION AND END-RESULTS

Extensive and diffuse leukoplakias involving a large part of the buccal mucosa as well as keratoses spread widely over one or both lips offer a difficult therapeutic problem. At the time of this study, these extensive lesions were generally given multiple applications of radium emanation, supplemented often—in the leukoplakia group—by monopolar desiccation or excision. This treatment, however, appears to have been inadequate. In table XIII, the two hundred and ten cases that contained sufficient data for tabulation have been divided by size

into three classes as follows: Small, those lesions not over 0.5 cm. in diameter; medium, 0.6-2 cm.; large 2.1+ cm.

TABLE XIII

FIVE-YEAR RESULTS IN RELATION TO SIZE OF LESION LEUKOPLAKIA AND KERATOSIS—210 CASES

Size of Lesion	Total Cases	Lesion "Cured"	Persisted	Developed Cancer
Small, 0-0.5 cm.	65	75%	22%	2%
Medium, 0.6-2 cm.	79	66	26	8
Large, 2.1+ cm.	66	49	30	14

The figures refer to the per cent of each of these size groups that was cured, persisted or developed cancer. It is seen that the highest per cent of persistent and of cancer cases is found in the "large", or more extensive group of lesions. Some authors have advised against any attempt to treat leukoplakias involving wide areas of mucosa with radiation. The figures presented in table XIII may be considered evidence in support of this view. It is probable that radiation had little influence on the end-results of the diffuse and widespread lesions. The results of both leukoplakias and keratoses over 2 cm. in diameter were equally poor.

PRESENT METHODS OF TREATMENT

In every case of leukoplakia or keratosis of the mouth or lip now entering the clinic for the first time, an effort is made first to eliminate all local factors of irritation. Emphasis is placed on the following: (1) Tobacco. Except for a moderate use of cigarettes, cessation of other forms of tobacco is strongly urged. (2) Teeth. Removal of rough and jagged stumps or of teeth worn to a sharp edge is advised, especially when such teeth are near the lesion: where a number of teeth are in a condition of hopeless decay, the patient is urged to enter the hospital for a total extraction. (3) Dentures. A careful examination is made of all permanent caps, crowns and bridge-work. Sharp edges are smoothed; apparatus that is suspiciously near an irritated lesion of the mucosa is removed when possible. If plates are in use, they are temporarily discarded where there is any evidence of irritation of the soft parts. If dissimilar metals have been used in fillings or dentures, the amount of galvanic current flowing between such metals is entered in the record. A consistently high current in successive tests or one flowing between metals adjacent to the lesion, is considered a sufficient reason for substitution of one of the metals with cement or other non-conducting material, or removal of the offending denture. (4) Oral Hygiene. An attempt is made to institute a routine of oral cleanliness. If Vincent's infection is found, it is treated. Pyorrhea and gingivitis are treated with sodium perborate and milk of magnesia mouth washes.

These measures are adopted in all cases of leukoplakia and keratosis. Further treatment depends upon the location, extent and progression of the lesion. Discrete keratoses of the lip respond satisfactorily to a single application of radium emanation used in bare steel needles in this clinic, without any filtration; a dose of three to ten millicurie hours being generally sufficient. If the lesion is heavily crusted or cornified, the radium is applied at a distance of 1 cm. Diffuse, extensive keratosis covering the whole lip may be treated, when superficial, with radium emanation moved back and forth over the lip. If the lesion is thickly crusted, however, good results are obtained by the use of from two to four thousand r units of high voltage x-ray, screened with 0.12 to 0.25 millimeter of copper. If the lesion persists, or if it becomes fissured, ulcerated, or acquires an indurated base, surgical excision with a wide margin is done.

A small discrete leukoplakia, if persisting or recurrent three months after the institution of the general measures outlined in the first paragraph, is destroyed by electro-desiccation under novocain.

If the leukoplakia is extensive, and persistent or recurrent after the removal of all local irritating factors, the presence of a systemic factor is strongly suspected. (1) Syphilis. In all new cases entering the clinic a blood specimen is routinely taken for Wassermann, Hinton and Kahn reactions. When syphilis is proved by these tests, appropriate measures are instituted for its control. (2) Vitamin A lack. On the purely theoretical grounds that vitamin A lack may be causal in some cases in which the entire buccal mucosa appears to be devitalized, highly irritable and predisposed to the constant formation of leukoplakia, large doses of vitamin A are given orally for a test period of three months. The results of this treatment, however, are as yet insufficient to justify any conclusions. (3) Susceptibility to cancer. In the presence of continued persistence or recurrence of leukoplakia, the patient is regarded as a case in whom an unknown factor has predisposed the buccal mucosa to malignant development. Frequent observation of the condition becomes imperative. When the lesion becomes thickened, cracked or fissured, electrosurgical excision is promptly done. Radium and x-ray are no longer used in this clinic to treat extensive leukoplakias. Experience shows that although there may be a good response in turn to each local application of radium, yet the whole oral mucosa cannot be treated at once, and new lesions form in other locations as fast as old ones are destroyed. Poor results in these cases must be accepted; prognosis will depend upon the stage at which an early cancer is recognized and eradicated. The patient must, therefore, be impressed with the fact that the most important element in the proper treatment of his condi-

tion is his coöperation and willingness to return every three months or less for observation in the clinic.

SUMMARY

A number of varied and unassociated factors are recorded as having appeared in the literature on the etiology of leukoplakia buccalis. These have been grouped into systemic and local factors. In an analysis of the incidence of cancer in five hundred and twenty cases of leukoplakia and keratosis of the mouth and lip seen at the Huntington Memorial Hospital, figures are presented that justify the contention that these are precancerous lesions. The three most important etiological factors have been analyzed in this group of cases. The bearing of location, duration and extent of the premalignant lesion on the end-result of treatment in two hundred and forty-eight selected cases has been presented with the full realization that conclusions must be guarded when based on such small numbers of cases. The present management and methods of treatment of these cases in this clinic have been briefly outlined.

CONCLUSIONS

(1) Leukoplakia buccalis and keratosis labialis are definitely precancerous lesions.

(2) Bad dental hygiene and the use of tobacco are both almost universal and equally important as etiological factors in leukoplakia and keratosis of the mouth and lip.

(3) Syphilis is found in about thirty per cent of patients with leukoplakia of the tongue, but it is of minor importance in all other buccal locations of this lesion.

(4) In the series of cases studied, the location of the lesion appears to have no prognostic significance. Similarly, the duration of the lesion before treatment has apparently no definite bearing on the results of treatment.

(5) The size and extent of the lesion seem definitely to influence the prognosis on the basis of treatment received between 1918-1926 at the clinic of the Huntington Memorial Hospital.

(6) Extensive leukoplakias involving wide areas of the buccal mucous membrane do not respond well to radiation. If the lesion persists after removal of all irritating factors, the patient must be kept under constant observation, and prompt electrosurgical excision should be done of any areas showing suspicious evidence of cancer.

The authors wish to acknowledge the careful and painstaking assistance of Miss Hilda M. Holton in abstracting the records, and the advice and assistance of Dr. C. C. Simmons and Dr. G. W. Taylor in preparing this paper.

TABLE XIV

No Cancer Before Entry—One Buccal Cancer After Entry—21 Cases

Case No.	Age	Premalignancy	Location	Time Interval	Location of Cancer	Evidence of Cancer	Time from 1st R_x to End Result	End Result
1	68	L&K	L. Lip	2 yrs.	L. Lip	P	8 yrs.	L&W
2	45	L&K	L. Lip & Mouth	2 yrs.	L. Lip	P	11 yrs.	L&W
3	75	L&K	U. Lip & Mouth	2 yrs.	L. Jaw	P	3 yrs.	D Ca.
4	72	L	Tongue	2 yrs.	Tongue	C	5 yrs.	D Ca.
5	47	L	U. Lip & Mouth	3 mos.	U. Lip	P	10 yrs.	L&W
6	52	L	L. Lip & Mouth	5 yrs.	L. Lip	P	6 yrs.	D Ca.
7	64	L	L. Lip & Mouth	5 yrs.	L. Jaw	P	5 yrs.	D Ca.
8	63	L	Tongue	7 mos.	Tongue	C	2 yrs.	D Ca.
9	62	L	Mouth	8 yrs.	Palate	P	9 yrs.	D Ca.
10	58	L	Mouth	1 yr.	L. Jaw	P	11 yrs.	L&W
11	51	K	L. Lip	8 yrs.	L. Lip	P	9 yrs.	D Heart
12	63	K	L. Lip	1 yr.	L. Lip	P	2 yrs.	D Ca.
13	57	K	L. Lip	1 mo.	L. Lip	P	5 yrs.	L&W
14	75	K	L. Lip	2 yrs.	L. Lip	P	13 yrs.	D Heart
15	42	K	L. Lip	4 yrs.	L. Lip	P	7 yrs.	L&W
16	70	K	L. Lip	8 mos.	L. Lip	P	1 yr.	D Ca.
17	75	L&K	L. Lip	5 yrs.	L. Lip	P	10 yrs.	L&W
18	49	L	L. Lip & Mouth	7 yrs.	Mouth	P	11 yrs.	L&W
19	70	L	Mouth	?	Mouth	C	3 yrs.	D Heart & Ca.
20[1]	59	L	L. Lip & Mouth	4 yrs.	L. Lip	P	7 yrs.	L&W
21[2]	72	K	L. Lip	6 yrs.	L. Lip	C	7 yrs.	D Ca.

1. Also epidermoid carcinoma of nose. Simultaneous with lip ca.
2. One year after entry had probable ca. excised L. Lip. On entry shows recurrence with neck metastases.

L&K—Leukoplakia and keratosis.
L. Lip—Lower lip.
U. Lip—Upper lip.
P—Pathological.
C—Clinical. D—Died.
L&W—Living and well.

TABLE XV

NO CANCER BEFORE ENTRY—TWO BUCCAL CANCERS AFTER ENTRY—4 CASES

Case No.	Age	Premalignancy	Location	Time Interval	Location 1st	Evidence 1st	Interval 1st to 2nd	Location 2nd	Evidence 2nd	1st R_x to End Result	End Result
22	54	L	Mouth	6 mos.	L. Alveolus	P	6 mos.	L. Jaw	P	6 yrs.	L&W
23	62	L	Mouth	4 yrs.	L. Lip	P	6 yrs.	Cheek	P	11 yrs.	L&W
24	85	K	U. & L. Lip	1 yr.	L. Lip	C	1 yr.	U. Lip	C	4 yrs.	D I&II
25	67	L	Tongue	6 mos.	L. Tongue	P	3 yrs.	Tongue	P	5 yrs.	D II

TABLE XVI

NO CANCER BEFORE ENTRY—NON-BUCCAL CANCER AFTER ENTRY—SKIN CANCER ONLY—3 CASES

Case No.	Age	Premalignancy	Location	Time Interval	Evidence Skin Ca.	End Result
26	62	L	Tongue	6 mos.	C	L&W
27	47	L	Tongue, Cheek	7 yrs.	C	D Subphrenic Abscess
28	69	L&K	L. Lip	7 yrs.	C	L&W

TABLE XVII

NO CANCER BEFORE ENTRY—ONE NON-BUCCAL CANCER AFTER ENTRY—7 CASES

Case No.	Age	Premalignancy	Location	Time Interval	Location of Cancer	Evidence of Cancer	Time 1st R_x to End Result	End Result
29	62	L	L. Lip & M.	5 yrs.	Stomach	Letter	5 yrs.	D Ca.
30	58	K	L. Lip	2 yrs.	Prostate	P	2 yrs.	D Ca.
31	62	L	L. Jaw	6 mos.	Thyroid	P	1 yr.	D Ca.
32	58	L	Tongue	12 yrs.	Rectum	P	14 yrs.	D Ca.
33[1]	60	K	L. Lip	4 yrs.	Stomach	Letter	4 yrs.	D Ca.
34	73	K	L. Lip	4 yrs.	Prostate	C	6 yrs.	D Ca.
35[2]	67	L	Mouth	8 yrs.	Liver	Letter	8 yrs.	D Ca.

1. End result report from Brockton Hospital.
2. End result report from Exeter Hospital. This patient also history of 3 local excisions of "growth" in front of ear before entry. Was treated on entry for recurrence of skin cancer and 5 yrs. later had another probable recurrence removed by his physician.

TABLE XVIII

NO CANCER BEFORE ENTRY—TWO CANCERS AFTER ENTRY, ONE BUCCAL—2 CASES

Case No.	Age	Premalignancy	Location	Interval	Location 1st	Evidence 1st	Interval 1st to 2nd	Location 2nd	Evidence 2nd	1st R_x to End Result	End Result
36	62	L	U. Lip & M.	5 yrs.	U. Jaw	C	4 mos.	Stomach	P	5 yrs.	D II
37	58	L&K	L. Lip	1 mo.	L. Lip	P	8 yrs.	Sigmoid	P	8 yrs.	L&W

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OPERATIVE SURGERY IN THE PULMONARY TUBERCULAR*

BY FRANK H. WASHBURN, M.D.†

WHILE the fundamental principles of surgery are unvarying wherever applied, surgical procedure may properly be modified by dyscrinism, systemic infections and specific diseases that are apart from conditions for which operation may be indicated. Thyroid disease, diabetes, hypertension, toxemia resulting from urinary obstruction, etc., each call for special modifications of procedure in preoperative preparation, anesthesia, technique, and aftercare. This is equally true of tuberculosis. Pulmonary tuberculosis is variant not only because it is tuberculosis, but because of involvement of the respiratory system.

In diagnosis, in the subject of active advanced disease, we may find a clouding of the picture. This may be particularly true in cases of acute and subacute infections. We have learned to discount the occasional absence of marked leukocytosis and abdominal rigidity in acute peritoneal cavity disease. Sometimes pain and tenderness appear less than in the average patient similarly afflicted, when keen observation only can appreciate the acuteness of onset, in one carrying the toxic manifestations of pulmonary tuberculosis. The differentiation of acute appendicitis and other infections involving the peritoneum, and tubercular invasions or metastases, may present a difficult diagnostic problem. Here the knowledge of the previous blood picture, always available in the sanatorium patient, is a distinct aid.

Preparation should be meticulously careful in the presence of active disease, and measures should be taken toward avoidance of psychic shock. This becomes easier when operation is to be performed in the sanatorium, but if the patient has been moved to another institution, to new surroundings and among different and strange personnel, care ought to be exercised in the suggestions of initial contact. Morale, so important to the end-results in operative surgery, is particularly so in this field. The toxic patient is infected readily making scrupulous preparation of the skin important.

Selective anesthesia we consider especially important. Could an anesthetic be chosen that would produce complete analgesia and at the same time prevent the effects of traumatism from reaching the cells of the central nervous system; if it would not contribute to surgical shock or would tend to prevent it; if it would not diminish or abolish the coughing or swallowing reflexes, or irritate the bronchial mucosa; and if its effect upon the vital organs, as the liver, kidneys, and heart, were not injurious, the task would be simple. This we cannot do, for ideal anesthetics are yet to be discovered.

Local infiltration with ample amounts of dilute procaine solutions, whenever practical, is safest and most desirable. Regional anal-

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gesia, by nerve blocking, in certain areas meets the requirements nicely. One of the best examples of this is cordal and transsacral injection in anal and rectal procedures. Where the work is to be done below the level of the diaphragm and infiltration is impractical, in our opinion, spinal block best meets the indications with, however, due regard for the usual contra-indications to this form of anesthesia. General anesthesia with all its objectionable features, in pulmonary surgery is a better choice than spinal for operations upon the upper portions of the body. Ethylene gas, nitrous oxide, and if necessary, even ether may be used. Narcotics and basal anesthetics should be used to relieve apprehension and lessen the amount of drugs by inhalation and the "Anocci-Association", technique of Crile, has a logical place in this field. Avertin is a desirable choice occasionally, particularly where a quiet respiration is desired. One of our objections to its use is the abolishment of cough and swallowing reflexes. It appears to be the most desirable of all basal anesthetics from the patient's standpoint. The general anesthetics, particularly ether, of themselves increase the burden and contribute to shock. In this fact lies a greater objection than in any local effect upon the bronchial mucosa, however much that may be. A skilled anesthetist is highly desirable. Care should be exercised in diagnosis to avoid unnecessary operations. Gentleness of technique is especially indicated, for the healing processes of the toxic tubercular are certainly far below the normal and reasonable speed in operating, particularly where general anesthesia is used. Spinal anesthesia is particularly an aid to rapid work and avoidance of tissue injury. Operations that may be done in multiple stages sometimes may be successfully thus done where otherwise shock might prove serious. Shock and infection are certainly much more facilitated in the tubercular than in the normal. Infected tissue must be amply drained and re-opening of wounds, sloughing edges, and even indolent ulceration may be avoided only by scrupulous care. Intestinal fistulae more often follow operations where incision or injury to intestine has been done than in the non-tubercular patient. This fact is to be kept in mind when dealing with conditions involving the bowel.

Pregnancy in the subject with pulmonary tuberculosis has served to annoy tuberculosis specialists, obstetricians, and surgeons alike since the statement of DuBois, many years ago, that "If a woman threatened with phthisis marries, she may bear the first accouchement well; the second with difficulty; the third never." That therapeutic abortion may be indicated in the case of pulmonary disease is undoubtedly perfectly true but it is not our purpose to define its indications. However, the mere diagnosis of tuberculosis does not justify abortion in our opinion. The definition of indications in a given case must necessarily rest to a large extent upon the physicians and tuberculosis specialists. Operation should never be done except with ample consultation with obstetricians and tuberculosis specialists, and then the operator should still reserve the right to form an opinion and consult his conscience before proceeding to evacuate the uterus. It will perhaps become his duty occasionally, but he must be wary of the urge he may meet to operate where definite necessity does not obtain. Children are born of tubercular mothers without apparent maternal injury sometimes and the average surgeon cannot usually alone determine when that happy outcome may result.

Delivery at term also presents an important problem. Keen obstetrical judgment is important and the prophecy as to whether labor will be easy or difficult places real responsibility upon the accoucheur. Cesarean section competently performed is probably preferable to "watchful waiting" wherever the prospect of difficult labor is present, particularly in the presence of advanced active disease, especially in the presence of pneumothorax and cavitation. However, section in itself is a hazard both as to mortality and morbidity as has been repeatedly proved statistically, and we believe is not indicated simply because the prospective mother has pulmonary tuberculosis.

Brevity of time allotted for the papers in this symposium precludes extensive discussion of the controversial question as to whether surgery upon the tubercular shall be done in the general hospital or in the sanatorium. After a not inconsiderable experience in surgery upon the tubercular and with a moderate familiarity with operation upon pulmonary processes per se, in both sanatoria and hospitals, it has become our conviction that wherever the equipment is ample and the personnel both ample and competent, there is much to be said in favor of the surgical department of the sanatorium. We take a middle ground, believing that tuberculosis sanatoria should be properly equipped and manned for surgery, also that the pulmonary patient should not be denied the privileges of general hospitals.

BRONCHOSCOPY IN THE SANATORIUM*

BY G. ARNOLD RICE, M.D.†

SOME eight or ten years ago at a meeting at this institution various members of the Staff read papers on Pulmonary Tuberculosis. I remember one paper that dwelt quite at length on the importance of taking a careful and complete history and after, among other things demonstrating several cases where patients were sent to this institution with the diagnosis of tuberculosis without positive sputum, it was found that they were suffering from some other disease, not tuberculosis. The paper was summed up by saying that a diagnosis of tuberculosis should be made on all facts obtained by the history, physical examination, x-ray and laboratory findings. At that time the reader of the paper cautioned us that in general the diagnosis could not be made on x-ray examination alone, and x-ray at that time was simply one of the aids in diagnosis. A few years later, at another meeting here, the reader of a paper on the diagnosis of tuberculosis summed up his paper by saying that no chest examination was complete without an x-ray examination; x-ray was apparently becoming of more value. Without question the technique of taking pictures and the ability to interpret them had meantime greatly improved. It has been interesting to note that they have continued to improve, until now, with much better x-ray apparatus, films, etc., many times, the diagnosis can be made, I presume, on x-ray examination alone.

However, there are cases where with careful history, physical examination, laboratory and x-ray study, there still remains a question of exact diagnosis. In many of these cases bronchoscopic examination is of great help; also bronchoscopic treatment is of value in many of the patients who have a chest condition found not to be tuberculosis.

I have some slides which I hope will illustrate how the bronchoscope has been an aid in making the diagnosis, also where it has been an aid in treatment. All of these cases have been carefully studied before being referred for bronchoscopy and just enough will be told about them to illustrate the value of bronchoscopy in diagnosis and treatment.

CASE I

Male, aged 34. History of cough of ten years' duration. Plain x-ray picture showed nothing definite.

Fig. 1. Bronchiectatic cavities after injecting lipiodol.

Fig. 2. Large abscess after removing many granulations, and pus from the branch bronchial openings

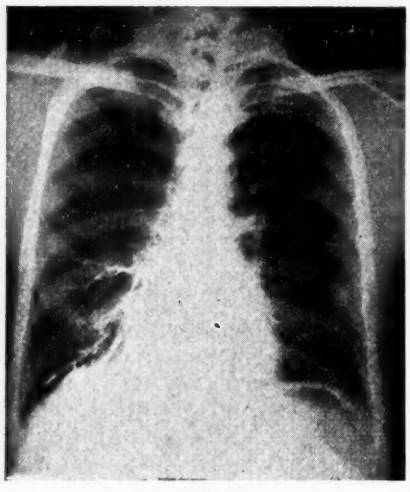

FIG. 1.

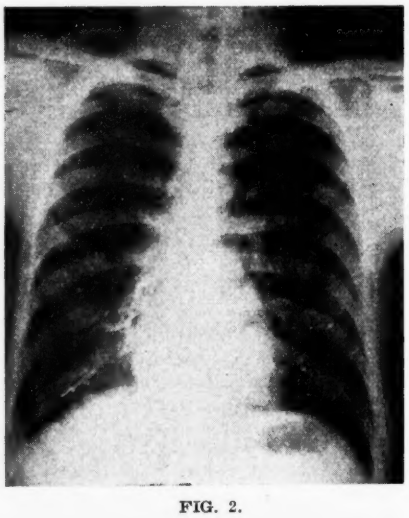

FIG. 2.

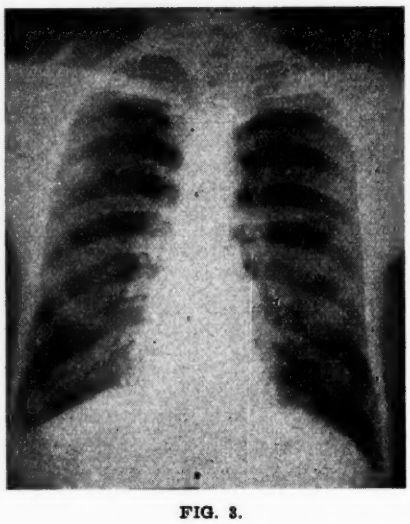

FIG. 3.

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and injecting lipiodol. A few weeks after this was taken the patient became quite ill and remained so for about ten days.

Fig. 3. This picture was taken some time afterward, a matter of about three weeks. There is the root of a tooth to be seen here, but it was mistaken for lipiodol as there are small amounts still scattered about the lobe.

The patient left the sanatorium against advice and later entered a general hospital where an x-ray was taken.

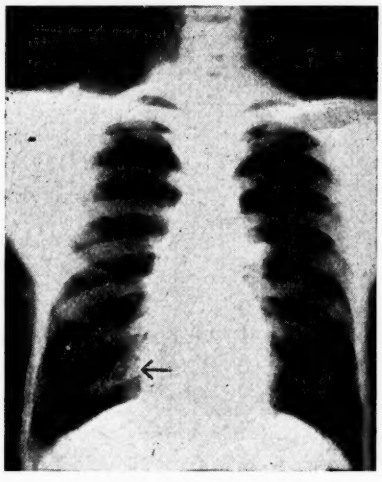

FIG. 4.

Fig. 4. This shows the root of a tooth very plainly. Little if any lipiodol remains in the lobe. The patient was operated on and died. Autopsy proved the shadow to be the root of a tooth. This case shows how obscure a foreign body can be and our assumption is that when this patient had his acute illness, described a few moments ago, the root of the tooth migrated from the abscess cavity to another portion of the lobe. Careful study of the first picture taken on admission to the sanatorium, shows no evidence of any shadow where it was later seen.

Case II

Female, aged 22. This patient was in bed for two and one-half years; treated for tuberculosis. The sputum was never positive; hemoptysis many times, averaged once a month. Plain picture showed a shadow which did not look like tuberculosis.

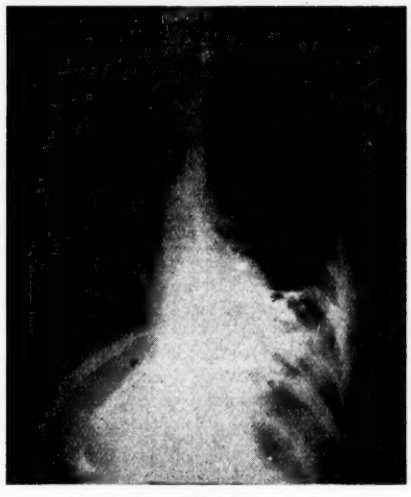

FIG. 5.

Fig. 5. Bronchiectatic areas after injection of lipiodol.

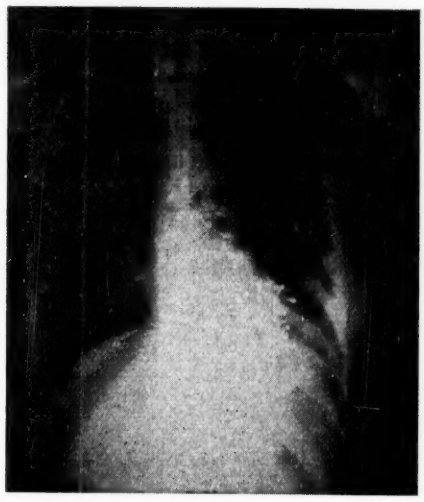

FIG. 6.

Fig 6. After removing granulation tissue of the branch bronchial openings, much pus was aspirated and lipiodol injected. An abscess cavity seen with a fluid level. Material from this area showed no tubercle bacilli in direct smear, culture, or inoculated guinea pigs. The patient had fourteen bronchoscopies over a period of eight months and daily postural drainage. Cough and expectoration ceased. Gained in weight and strength; discharged clinically well. Returned about one and one-half years later still feeling well and free from symptoms and entered the Rutland State Sanatorium Training School for Nurses.

These two cases, I believe, illustrate how more knowledge can be obtained by bronchoscopic instillations of lipiodol than injecting lipiodol supraglottically. In both of these cases the abscess woud have been missed had the granulations and débris not been removed through the bronchoscope before instilling the lipiodol.

Case III

Male, aged 21. The patient was an invalid for five years before admission to this institution. Much

FIG. 7.

cough and expectoration, day and night. He was weak, thin and emaciated; had hemoptysis many times. The sputum was never positive for tuberculosis. Plain picture showed nothing definite.

Fig. 7. Bronchiectasis; saccular type; an advanced case.

This patient received eighty-two bronchoscopies over a period of twenty-one months and daily postural drainage. He gained in weight and strength; the gain in weight was twenty-two pounds. He was discharged much improved. At the time he was discharged he stated that he felt perfectly well. He is at the present time self-supporting, leading an active life. He has been an employee of this institution for over a year. He still does postural drainage twice a day, which are the only times he coughs.

Case IV

Female, aged 20. The patient had pneumonia six months ago. Plain picture showed nothing definite. She had failed to gain in weight and strength; continued to cough and had occasional blood-streaked sputum which showed no tubercle bacilli in the smear.

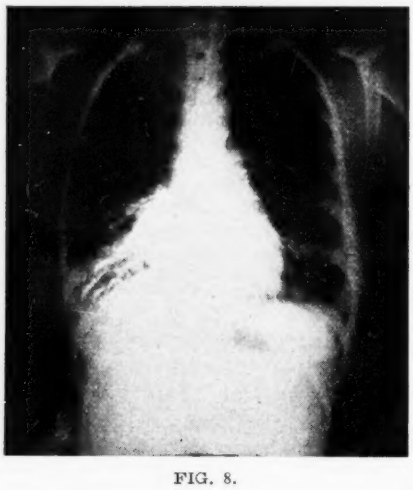

FIG. 8.

Fig. 8. Comparatively early bronchiectasis. Smear of material direct from the bronchus showed no tuberculosis. Cultures and guinea-pig inoculations negative for tuberculosis. She had seven bronchoscopies, weekly and daily postural drainage. The cough and expectoration ceased; she gained in weight and strength, and now weighs more than she ever did in her life.

These two cases show the possibilities of bronchoscopic treatment in the advanced case; and in the comparatively early case, how quickly and effectively bronchoscopic treatment can aid in clinical recovery.

Case V

Female, aged 7.

Fig. 9. This picture was shown by courtesy of Doctor Davidson of Worcester, Massachusetts. The patient was taken to Doctor Davidson's office for examination and to determine the advisability of tonsillectomy. The child was thin, pale and below par physically, and had practically no cough. Doctor Davidson found that a roentgenologist in Boston had taken a picture nine months previously. He wrote to the roentgenologist whose report apparently showed that the same shadow existed nine months before. Doctor Davidson made a tentative diagnosis of atelectasis of the right middle lobe. He referred the patient for bronchoscopic examination. Bronchoscopy was done and 15 cc. of thick, frank pus was aspirated from the right middle lobe bronchus. Direct smear showed organisms usually found in lung abscess; no tubercle bacilli. A guinea pig was inoculated.

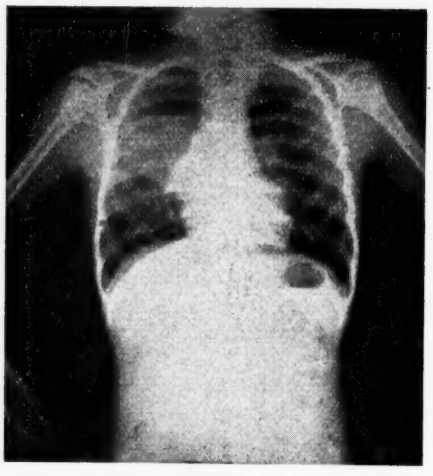

FIG. 9.

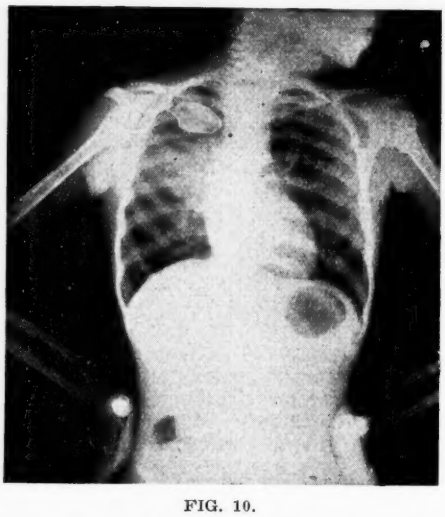

FIG. 10.

Fig. 10. This picture was taken fourteen days after bronchoscopy. It shows the middle lobe clearing. The guinea pig, five weeks after inoculation, was killed and found to have tuberculosis. This is a case of tuberculosis diagnosed with the aid of the bronchoscope.

Case VI

Male, aged 49.

Fig. 11. This picture was shown by courtesy of Doctor Davidson. The patient was a wanderer. He saw nineteen physicians, but no diagnosis was made. He was in a general hospital for two months, and left against advice. He had a harsh, non-productive cough; steady loss of weight and strength. He was sent to me by a nurse for bronchoscopy. I referred him to Doctor Davidson for x-ray and advice as to need of bronchoscopy. He was returned to me by Doctor Davidson with tentative diagnoses: 1—Tuberculosis; 2—Large lung abscess. Bronchoscopy was

done; curved aspirating tube inserted into the right upper lobe bronchus. Few cc. of pus were aspirated. Direct smear showed numerous tubercle bacilli. Diagnosis of tuberculosis made bronchoscopically.

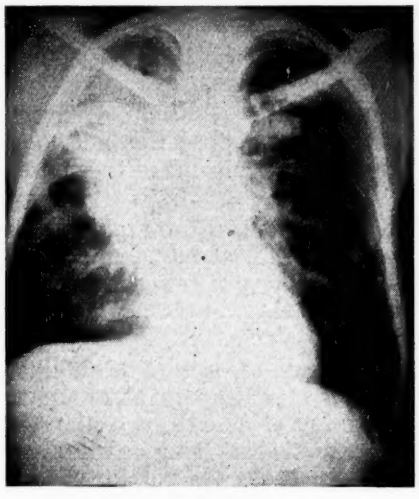

FIG. 11.

CASE VII

Female, aged 29. This patient was sent here with diagnosis of tuberculosis but with negative sputum.

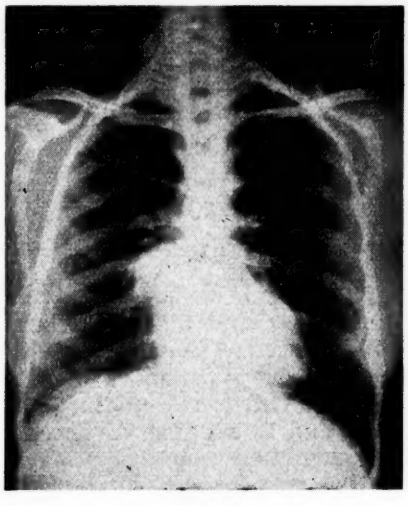

FIG. 12.

Fig. 12. Plain picture taken. No definite diagnosis could be made from this picture. Bronchoscopy was done. Growth was seen in the right bronchus. Biopsy was done; pathological report: "Adeno-carcinoma." A bi-lobectomy was done at the Massachusetts General Hospital one and one-half years ago by Doctor Churchill; the right middle and lower lobes were removed. Patient today is living and well; taking care of two children and leading an active normal life. This shows the value of an early diagnosis.

CASE VIII

Male, aged 42. The patient was sent here with a diagnosis of tuberculosis with the sputum negative.

Fig. 13. A plain x-ray picture was taken. No definite diagnosis could be made from this picture alone. The staff advised chest tap at one of the conferences. This was done with a resulting dry tap. He was referred for bronchoscopy. At the bronchoscopy a tumor was seen in the right major bronchus. Biopsy was done. The pathological report was as follows: "Epidermoid Carcinoma—Type 2." The patient was referred to the Pondville State Cancer Hospital from

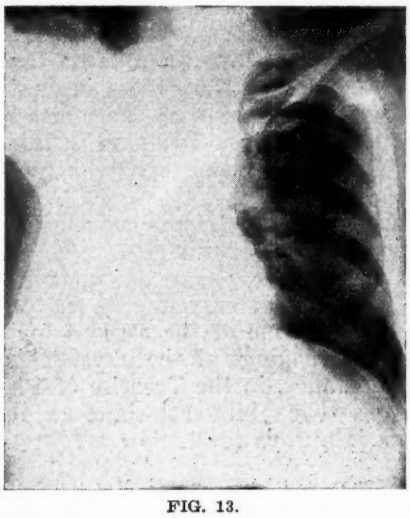

FIG. 13.

where, a number of weeks later, he was discharged as incurable. A few weeks later he died at home. This shows the result in a late diagnosis.

CASE IX

Female, aged 31. She was admitted to this institution December 12, 1931, in poor condition and suffering from a severe attack of asthma.

A plain x-ray picture showed nothing definite.

December 24, 1931, the staff made a tentative diagnosis of tuberculosis. The patient continued to lose weight and to have asthma. January 15, 1932, she was placed on the danger list and her relatives were notified. She was put on digitalis. A week later bronchoscopy was done; bronchial lavage with normal salt solution. Relief of asthma was immediate. The patient received five bronchoscopic treatments after which she had no more asthma. Her condition in general continued to improve and she was discharged July 26, 1932, in good condition. Diagnosis: Asthma.

CONCLUSION

I wish to say in conclusion that in cases of hemoptysis not proved to be tuberculosis, and cases of unexplained cough, we believe that bronchoscopy should be seriously considered as an aid in diagnosis. Bronchoscopy can be done under local anesthesia; general anesthesia is never necessary; the operation can be done in a few minutes without too great inconvenience to the patient.

BILATERAL PNEUMOTHORAX*

BY GABRIEL NADEAU, M.D.†

HISTORY

THE first mention of bilateral pneumothorax for the treatment of pulmonary tuberculosis was made in Rome in 1912 at the International Congress for Tuberculosis. In 1928, two excellent studies on the subject were published: one by De Castiglione, the other by Terrasse. In this country, Dr. Geer was one of the first to use it with success. He made a preliminary report of his experience with that form of treatment in 1923[1]. It was first used in this institution by Dr. Jacob Kaminsky, who reported on two cases in 1931[2].

In this country, symmetrical pneumothorax or bilateral pneumothorax was still a debatable procedure until a few years ago, and it has been used to some extent only during the past three or four years. One of the reasons for so little use was the teachings of the physiologists. We read for instance, in the Treatise of Physiology of Landois, that "bilateral simultaneous pneumothorax is always fatal."[3]

CLASSIFICATION

Symmetrical pneumothorax can be divided into two types:

1—the simultaneous type
2—the alternate type

In the simultaneous type, the two lungs are submitted to collapse at the same time. In the alternate type, the opposite lung is collapsed only after the other side has reëxpanded.

INDICATIONS

1—Early bilateral lesions in young people.

2—The breaking down of one lung after the opposite lung has been collapsed.

3—To correct a marked displacement of the mediastinum due to unilateral pneumothorax. In that case only a small marginal collapse is necessary.

CONTRA-INDICATIONS

1—Poor general condition. The symmetrical pneumothorax is quite a strain on the patient, and only subjects in good general condition can be expected to improve under it.

2—Complications: tuberculous laryngitis, tuberculous enteritis or any other form of active extrapulmonary tuberculosis are contra-indications.

3—Acute progressive lesions on both sides.

4—Old fibrous lesions.

*Read before the Worcester District Medical Society at the Rutland State Sanatorium, in the Symposium on Pulmonary Tuberculosis, on October 11, 1933.

†Nadeau, Gabriel—Senior Physician, Rutland State Sanatorium. For record and address of author see "This Week's Issue," page 1034.

TECHNIQUE

1—The technique of insufflation is the same as for unilateral pneumothorax.

2—It requires closer observation, however, and frequent fluoroscopy, so as not to push the collapse too far and make the patient dyspneic.

3—There should be an interval of a few days between the refill of both lungs, although in my service I have a few times refilled a patient on both sides in one sitting without any discomfort.

4—A selective collapse should be obtained if possible. It is more important to strive toward the obtaining of a selective collapse in bilateral pneumothorax than in unilateral pneumothorax, because the patient should be left some lung surface with which to breathe. The collapse of the lungs, however, can be pushed surprisingly far. It has been demonstrated that a patient can be comfortable with only a tenth of his lung area left.

PLEURAL COMPLICATIONS

The pleural complications, like the formation of fluid or the perforation of the lung, are not more frequent in the bilateral than in the unilateral form, but they are of more serious consequence. An effusion filling the pleura cavity on one side, and a collapse on the other, will make the patient extremely ill.

REPORT OF CASES

In this institution, we have been using bilateral pneumothorax since 1929. We have had 26 cases up to the present time. Twenty-four were of the simultaneous type, and 2 were of the alternate type. Thirteen were moderately advanced cases and 13 were far advanced cases.

From 1929 to 1931, the staff was a little reluctant to use this form of treatment on early cases. During that period, seven cases were started. They were almost terminal cases, and pneumothorax was done only as a last resort. Four of these had complications, such as tuberculous laryngitis and tuberculous enteritis. After a year or so, the treatment had to be discontinued on five of them because the progress of the disease could not be checked. These five are dead. The other two are living and doing well. Of the remaining 21 cases, seven have been discharged and are doing well. Thirteen are still here under treatment, and are also doing well. The sputum is now negative and has decreased to a scanty amount in 16 of these cases. It has remained positive in five of them. During 1932 and 1933, we have collapsed more ideal cases.

CHEST SURGERY

Chest surgery is not incompatible with bilateral pneumothorax. Of the 13 cases in the house, three had one intrapleural pneumolysis, two had two pneumolyses operations, and one had three pneumolyses operations performed. The pneumolyses operations were performed by Dr. Frank H. Washburn of Holden. Four cases had a phrenicectomy.

The proportion of the bilateral pneumothorax to the unilateral form in this sanatorium is about ten per cent. We have here at the present time, 125 cases of artificial pneumothorax, and as mentioned before, 13 are bilateral cases.

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EVOLUTION OF PNEUMOTHORAX THERAPY*

BY ARMAND LAROCHE, M.D.†

THE following is not an attempt to give a complete history of pneumothorax therapy but is a short discussion of a few important points which may be of interest.

In this country, only four years after the original report of Forlanini, the first physician to use this therapy and to urge the medical profession to do so, was John B. Murphy of Chicago who reported five cases in 1898. He later declared that he knew nothing of Forlanini's work at the time. His pupil Lemke[1] reported the treatment of 53 cases by a similar method at a meeting of the American Medical Association in 1901, but his paper was practically ignored, and his premature death was one of the causes of the delay in the acceptance of the treatment by the medical profession in this country. It was not until ten years later that it was used to a certain extent by Harris, Mary Lapham, Robinson, Balboni and Floyd.

In this institution, pneumothorax was introduced in August, 1911. At that time it was looked upon as an experiment, and for experimental purposes was tried out in a large number of cases in the different stages of pulmonary tuberculosis. In 1914, the results were reported as follows: 74 cases had been treated and 23 or 31 per cent had been benefited while 51 or 69 per cent had received no benefit at all.

Alley[2] wrote in 1919, "those results were considered more or less doubtful and consequently during the last three years (1915-1918) we have given the course of nitrogen gas treatment to but 21 patients; our results however have been much more gratifying and successful. Sixty-six per cent were improved. All the cases had followed the strictest routine as regards fresh air, rest, regulated diet and exercise for several months previous to the gas treatment and still had failed to improve."

The above statement gives a good idea of the type of patient which was given the treatment at that time not only here but throughout the United States and Europe. With the exception of a few workers in different countries, such as Rist in France, Brauer in Germany, Begg in the United States, and their followers, the majority believed with Kuhn that "pneumothorax treatment was only a last resort for severe and hopeless cases".

These ideas prevailed for several years and were apparently due to lack of scientific control in the selection of cases and to ignorance of the transformations in the chest while the treatment was given. It was only when x-rays were better known, and more liberally used, that the confusion decreased and the value of the treatment was generally recognized.

In this sanatorium, the number of patients treated by pneumothorax began to increase in the early nineteen-twenties. The progress was rather slow at first but was quite rapid during the last four or five years as indicated below:

1928	54 cases treated by pneumothorax	770 x-rays taken
1929	117 cases treated by pneumothorax	1074 x-rays taken
1930	138 cases treated by pneumothorax	1605 x-rays taken
1931	178 cases treated by pneumothorax	1581 x-rays taken
1932	194 cases treated by pneumothorax	2180 x-rays taken

In the annual report for the year 1925, it is noted that 152 fluoroscopic examinations were done during the year; at the present time we are doing that number every week. I have included these figures to emphasize the extreme importance of the use of the x-rays in the diagnosis and treatment of pulmonary tuberculosis.

During the year 1932, the average number of patients treated by pneumothorax was about 125, or 33 per cent of the total number of patients in the sanatorium, including those who had been started in the previous years and were still under treatment here. The average number of patients treated by pneumothorax in New England at that time was about five per cent.

*Read before the Worcester District Medical Society at the Rutland State Sanatorium, in the Symposium on Pulmonary Tuberculosis, on October 11, 1933.

†Laroche, Armand—Senior Physician, Rutland State Sanatorium. For record and address of author see "This Week's Issue," page 1034.

A survey was made that same year by Hawes[3] who obtained the opinion of thirty to forty leading men in tuberculosis work in this country, including California, New York, the Mid-West and New England, concerning the number of cases out of a given one hundred that should at least be granted the opportunity of having some form of collapse therapy, such as pneumothorax, phrenicectomy or thoracoplasty. The figures varied from 10 per cent to 50 per cent. To mention a few names: Dr. Henry D. Chadwick, who had 1500 patients under his supervision in Detroit, reported that 57 per cent of them were receiving some form of collapse therapy; Dr. Willard B. Soper of New Haven gave approximately 60 per cent; Dr. James A. Miller of New York gave 30 per cent, and so on.

The factor which contributed the most to bring about the definite establishment and general recognition of pneumothorax therapy is, as I have said before, undoubtedly the development of the x-ray which enabled the clinician to make a more judicious choice of cases, to develop a rational technique and to devise methods of increasing the efficiency of the treatment.

Artificial pneumothorax at the present time is the treatment considered for favorable cases and is not recommended for terminal cases as in the past. Of course there is still a great divergence of opinion with regard to the type of case which should or should not be collapsed. "This is due to the differences in the conception of various workers concerning the clinical pathologic states of the diseased lung", according to Dr. Edgar Mayer. However, most of the phthisiologists agree that the unilateral case showing caseation, with or without cavity formation, should be submitted to the treatment, but beyond this the agreement ends. Whether the early case, and the bilateral case, should be collapsed is still a debatable question. It is our practice to collapse all early lesions showing clearly on the x-ray. The reason for this is that we see too many young people leaving the sanatorium as quiescent cases, in good general condition, returning sooner or later in a pitiful state. Another reason for so doing is the fact that often small cavities are not visible on the x-ray until after the lung has been partially collapsed, and, finally, because 25 per cent of moderately-advanced and far-advanced cases have no free pleural space. We also collapse readily one lung when the lesion in the contralateral lung is localized and shows signs of fibrosis. Another type of bilateral lesion which we do not hesitate to collapse is the so-called "crossfire infection" with a cavity in the upper half of one lung and an exudative lesion in the base of the other lung.

The best results are anticipated in cases with lesions localized and showing little or no fibrosis, as cavities with thick firm walls are often only displaced, or partly collapsed, especially if the mediastinum is mobile.

With reference to technique, Murphy in 1898 advised the introduction of gas into the pleural cavity until the patient was frankly dyspneic, and at least between 2000 and 3000 cubic centimeters for the first dose. He also advocated a very short period of treatment, such as only one dose of gas in certain cases. In 1916, Fishberg[4] wrote that he himself did not inject more than 300 cubic centimeters for the first dose but that he used as much as 600 for the second and 1200 cubic centimeters for the third dose. He also stated that many workers did not hesitate to introduce two to three times as much, and that some even attempted to secure a complete collapse of the lung during the first operation. In the early nineteen-twenties, 1000 to 1500 cubic centimeters introduced every three weeks was still the practice in many places. To start a case now, it is generally accepted that small doses of air, frequently repeated, are much safer and give far better results. It is our practice not to use more than 200 to 300 cubic centimeters of air for the first dose and to repeat it at least twice a week for a while. It is seldom that we give more than 500 cubic centimeters at any one time.

Unfortunately, it is not always possible to induce pneumothorax when it seems indicated, and adhesions often prevent it from being effective when it has been induced. In 1924 Matson[5] reported:

> In 600 cases, 120 or 20 per cent had no free pleural space.
>
> In 245 cases, or 40.8 per cent, the collapse attained was only partial.
>
> In 235 cases, or 31.2 per cent only, was a satisfactory pneumothorax induced.

Only a very few did not seem to have adhesions.

For those with no free pleural space, nothing can be done of course so far as pneumothorax is concerned, and up to a few years ago for those with only a partial and ineffective collapse, the operator had only the choice of trying to stretch the adhesions with high positive pressure, which is a very dangerous procedure, or giving up the pneumothorax entirely, and hoping for the best.

Since 1927 (at least in this part of the country, since these procedures had been practiced in Europe for several years) phrenicectomy and pneumolysis have been life-savers for a good proportion of those cases.

Phrenicectomy is now used to improve the collapse in connection with pneumothorax at least in this institution only when pneumolysis has failed, and for diaphragmatic adhesions especially, it is still of great help in relieving the pressure and allowing the lung to be further collapsed. It also has the advantage of lessening the dangers of positive pressure.

Pneumolysis is now considered an indispensable adjunct to artificial pneumothorax and the

results obtained with it more than justify its use in the numerous cases submitted to it; even if there are occasional complications following the procedure. It is another factor which is largely responsible for the increase in the number of patients treated successfully by pneumothorax. To illustrate this statement, I shall briefly review the work done here on patients admitted in 1932 with regard to pneumothorax treatment:

393 patients were admitted during the year, classified as follows—

44 minimal,
155 moderately advanced
159 far advanced
7 childhood type
3 carcinoma
6 bronchiectasis
17 unclassified

Of the 358 cases of pulmonary tuberculosis, 145 cases or 40 per cent were considered suitable for pneumothorax therapy. Of this group of 145 cases, 5 or 1.4 per cent, refused the treatment; in 38 or 26 per cent, there was no free pleural space; in 42 or 29.7 per cent, the pneumothorax was considered effective; and in 60 or 41 per cent, the pneumothorax was considered ineffective. In this group of 60 ineffective cases, the pneumothorax was discontinued or lost in 17 cases, pneumolysis was attempted in 43 and was considered successful in 33 and unsuccessful in 10 cases. Of the last 10, phrenicectomy was performed in 5 cases and pneumothorax continued, and thoracoplasty was performed in 2 cases. Consequently, instead of having only 42 cases, or 29 per cent of the 145 cases treated effectively by pneumothorax, as would have happened a few years ago, we had 80 cases or 55 per cent.

I think that our results justify, to say the least, the increase in the number of patients treated by collapse therapy, and we see no reason why these forms of treatment should not be continued and applied to a greater number of patients.

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VACCINATION FOR PSITTACOSIS

In the Delta Omega lecture at the Yale Medical School on April 27, Dr. Thomas M. Rivers of the Rockefeller Institute for Medical Research proclaimed his belief in the potency of vaccination against psittacosis.

He reported that seven laboratory workers at the Rockefeller Institute had been given this vaccine.

SUMMARY OF MORTALITY FROM AUTOMOBILE ACCIDENTS

Number of Deaths, April 17, 1932, to April 14, 1934, from Automobile Accidents

The Bureau of the Census announces that during the four weeks ending April 14, 1934, 86 large cities in the United States reported 616 deaths from automobile accidents. This number (616) compares with 513 deaths during the four weeks ending April 15, 1933. Most of these deaths were the result of accidents which occurred within the corporate limits of the city, although some accidents occurred outside the city limits.

For comparison, the number of deaths due to automobile accidents within city limits is desirable. Such figures are available for the four-week period ending April 14, 1934, and for the corresponding four-week period of 1933 for all of the 86 cities, the four-week figure in 1934 being 503 as contrasted with 421 for the corresponding four weeks in 1933.

Considering by four-week periods since January, 1930, total deaths from automobile accidents, whether within the city limits or outside, the lowest total (513) appears for the four-week period ending April 15, 1933, and the highest (877) for the four-week period ending January 23, 1932.

MORTALITY RATES

Telegraphic returns from 86 cities, with a total population of thirty-seven millions for the week ending April 21, indicate a mortality rate of 12.2 as against a rate of 11.0 for the corresponding week of last year. The highest rate (18.9) appears for St. Louis, Mo., and the lowest (6.8) for Yonkers, N. Y. The highest infant mortality rate (14.0) appears for New Orleans, La., and the lowest for Duluth, Minn., Evansville, Ind., Grand Rapids, Mich., Long Beach, Calif., Schenectady, N. Y., Somerville, Mass., and Tacoma, Wash., which reported no infant mortality.

The annual rate for 86 cities is 12.6 for the sixteen weeks of 1934, as against a rate of 12.1 for the corresponding period of the previous year.—*Bureau of the Census.*

VERMONT STATE MEDICAL SOCIETY

THYROID DISEASES*

BY FRANK H. LAHEY, M.D.†

I WOULD like to discuss with you some of the more recent developments in thyroid surgery and keep away as much as possible from the more common aspects of thyroid disease and so I will perhaps in a more or less haphazard manner, speak of several subjects relating to thyroid states.

I first wish to speak of exophthalmic goitre in children. When we first began to deal with exophthalmic goitre or hyperthyroidism in young children for instance at the age of three or three and a half, we were quite timid about the condition because we had not had a background of experience from which to draw and because of the reaction of such young children, particularly as relates to the high degrees of tachycardia in this disease. We all know how easily young children react to any toxic influence and how easy it is for marked tachycardia and high temperatures to result from any intoxication. Our first experiences with hyperthyroidism impressed us very seriously since children of three, four and five with hyperthyroidism were able to show such tremendous degrees of tachycardia and temperature reactions to the disease. At the beginning of our experience we were opposed to operating on these children because of this apparently dangerous reaction but we have learned now from a large background of experience that hyperthyroidism even in very young children, with few exceptions, is very similar to hyperthyroidism in the adult. We know that intense hyperthyroidism in children is perhaps a little more dangerous from a surgical point of view than intense hyperthyroidism in a young adult, but the clinical course of the disease, the reaction and the postoperative results following subtotal thyroidectomy are almost exactly parallel with those following surgical procedures for this disease in adults.

The two exceptions as relates to hyperthyroidism in very young children as compared with the disease in adults are the following: first, the matter of severe postoperative reactions about which we have already spoken. Because of the excessive reactions which can occur in children, thus making it impossible to differentiate true toxicity reaction and the reaction which the very young individual is capable of, it becomes necessary, we believe, in very severe cases to divide the operation into two stages. We, therefore, feel that in severe hyperthyroidism in young children, if there is the slightest doubt about the condition as to whether the reaction is evidence of true toxicity or of age, it is better to be on the safe side and do the operation in two stages. For this reason, we do a much higher percentage of two-stage operations in young children with severe hyperthyroidism than in adults.

Next, we know that if one removes too much thyroid in an adult, it can be replaced very satisfactorily by the administration of thyroid extract. In children, however, one must realize that the thyroid gland is not only essential for the maintenance of metabolism but also necessary during the course of their development. For this reason, we believe that it is wise to take extreme precaution to be sure that too much thyroid tissue is not removed at the operation and to be certain that minus degrees of metabolism are not produced. We, therefore, believe that in doing subtotal thyroidectomies in children, it is wise to leave larger remnants of thyroid than would be left in a similar case in an adult.

As the result of our experience with a number of these cases, we now feel that the indications for surgery, even in very young children, as young as three years of age, in hyperthyroidism are exactly similar to the situation with adults and the results are equally good.

I want to present to you also one of the dangers relating to exophthalmic goitre which has not been particularly stressed in many of the discussions of this disease and that is, the danger to the eyes. Anyone having a patient with marked exophthalmos must remember that that patient is only a step removed from being totally blind. We have seen six eyes in this disease lost from extreme exophthalmos.

If one has a patient with extreme exophthalmos, this can go on to such a degree that lid pressure produces an edema of the conjunctivae with a wrinkling and molding of the conjunctivae. When one realizes that the conjunctiva receives its nourishment by osmosis and not by direct blood supply, it is easy to understand how readily erosion and slough can occur in this structure as the result of the edema, which causes the piling up and the lid pressure. Once an ulceration has taken place in this edematous and wrinkled conjunctiva, infection of the eyeball eventually requiring enucleation is but a step in advance of the operation.

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Furthermore, anyone who operates on patients with marked exophthalmos should realize how easy it is to traumatize the eye, produce erosion of the cornea, infection and serious eye infection.

These patients are often taken to the operating room deeply narcotized by preoperative drugging. Unless their prominent eyes are protected, these stuporous patients may unconsciously drag the sleeve of the nightgown across their prominent conjunctiva, produce an erosion, infection and, as already stated, serious eye infection. It is essential also that anesthetists realize the danger of injury to exophthalmic eyes during operation and that these eyes should be protected with vaseline and gutta percha against injury during the anesthesia for thyroid operations.

There is another peculiar type of troublesome exophthalmos that up to recently has been but little understood and that is the postoperative exophthalmos which occurs in the presence of minus degrees of metabolism following successful subtotal thyroidectomy as relates to the relief of symptoms in certain cases of hyperthyroidism.

We have occasionally seen cases as have other surgeons dealing extensively with hyperthyroidism in which subtotal thyroidectomy was successfully done, an excellent result obtained as to relief of symptoms, but instead of the exophthalmos subsiding, it has become progressively more marked and this has gone on even in the presence of marked minus degrees of basal metabolism.

Likewise we have seen such a situation occur in the form of unilateral exophthalmos in a patient operated upon by subtotal thyroidectomy elsewhere with the production of minus metabolism and relief of symptoms but progressive increase in prominence of a single eye.

This type of exophthalmos, occurring as it does in the absence of symptoms of hyperthyroidism and in the presence of a minus metabolism, has always been difficult to understand and there was no satisfactory explanation for it until recently, following the investigation of Dr. Howard Naffziger of San Francisco.

Dr. Naffziger has demonstrated that the cause of exophthalmos in these cases with minus metabolism is due to a myxomatous infiltration of the ocular muscles producing swelling of these muscles to such an extent that they fill the orbital sockets and push the eyes forward. For this condition, he has developed an operative procedure whereby the bony roof of the orbit is removed, thus producing greater room for the large ocular muscles and so, decompression of the orbital sockets and recession of the prominent eyes.

We have turned three cases of this type over to Dr. Gilbert Horrax of our Clinic for this operative procedure, because of his interest in brain surgery.

A bony flap of skull is turned down on either side of the frontal lobe. The frontal lobes on both sides are lifted up and the entire bony roof of the orbit is rongeured away. The fibrous ring of Zinn, which produces constriction due to the swelling at the apex of the orbit is severed, thus relieving a vascular back pressure on the orbital contents. This has resulted in immediate recession of the eye, improvement in the exophthalmos and will be a valuable and useful operation in this hitherto intractable condition.

Another atypical state of hyperthyroidism about which we have written a good deal, is the hyperthyroidism occurring in old people.

One sees two types of hyperthyroidism in older people. Not infrequently when hyperthyroidism occurs in elderly people, there is the typical picture of activated hyperthyroidism as seen in younger individuals. On the other hand, there is a condition which we have termed "apathetic hyperthyroidism" in which many of the striking signs of activation associated with hyperthyroidism in younger individuals are absent.

I am particularly anxious to discuss this aspect of hyperthyroidism because it is so lacking in the striking clinical features of the disease and is, I believe, so often overlooked and undiagnosed.

One should realize that in elderly individuals, hyperthyroidism of this atypical variety may exist in the entire absence of any eye signs, even stare, and entirely without any enlargement of the gland. The gland, however, in this type of hyperthyroidism is usually firm and somewhat nodular as though filled with small pebbles. One should realize that in this apathetic type of hyperthyroidism, contrary to the type of facies seen in activated hyperthyroidism, the features are in complete repose and there is even the appearance of apathy which has caused us to distinguish this condition by the term, "apathetic hyperthyroidism". The forceful pounding apex beat which is so characteristic of activated hyperthyroidism is often entirely absent in apathetic hyperthyroidism, the hyperthyroidism occurring in the aged. The character of the pulse which in activated hyperthyroidism is often so snapping and toxic in character, is frequently not striking in apathetic hyperthyroidism. The skin which in activated hyperthyroidism is hot, moist and flushed, in apathetic hyperthyroidism is often cool, pigmented and wrinkled. The basal metabolism which in activated hyperthyroidism is often strikingly elevated, is in apathetic hyperthyroidism often only moderately elevated, twenty-five, thirty or thirty-five. There is, as a rule, with apathetic hyperthyroidism a progressive and considerable weight loss which we have stated because the period of time over which it extends is often not appreciated by the patient and frequently not by the examiner.

One should realize that these patients with

apathetic hyperthyroidism who are not activated and so do not present the striking danger signals of activated hyperthyroidism, nevertheless present great possibilities for an operative fatality. While they seem quite safe, it is always possible for them, following a subtotal thyroidectomy, to demonstrate unusual postoperative reactions.

I feel particularly impelled to speak of the postoperative reactions with apathetic hyperthyroidism because they are so different from the postoperative reactions with activated hyperthyroidism. These patients with apathetic hyperthyroidism may go downstairs from the operating room following too much thyroid surgery and instead of becoming delirious with rising pulse rates and marked activation, become stuporous, drowsy, apathetic and finally die in coma. Death with apathetic hyperthyroidism is entirely different from the postoperative deaths in activated hyperthyroidism.

One should always have in mind the possibility of apathetic hyperthyroidism in any patient with marked myasthenia, with moderate but definite and persistent degrees of tachycardia, with pigmented skin and with unexplained weight loss.

So strongly do we feel about the dangers of apathetic hyperthyroidism, that when we feel that any patient has real apathetic hyperthyroidism, we unhesitatingly divide the operation into two stages.

The end results following subtotal thyroidectomy for apathetic hyperthyroidism are quite as satisfactory as with activated hyperthyroidism.

Another somewhat unusual thyroid state is that of intrathoracic goitre. We have now operated upon 1,086 intrathoracic goitres of which 745 or 68 per cent extended nearly to the arch of the aorta in the mediastinum and 341 or 32 per cent extended to or below the level of the arch of the aorta, in the mediastinum.

We feel very strongly that any patient who is having any signs of mechanical respiratory obstruction should have his superior mediastinum x-rayed as to the possibility of an intrathoracic goitre.

We likewise feel from our large experience with goitre, now amounting to between twelve and thirteen thousand goitre operations, that any patient with an adenomatous goitre may have an unsuspected intrathoracic goitre. For that reason, all patients with adenomatous goitres should have x-rays of the mediastinum by which a flattening or deviation of the trachea can be demonstrated and intrathoracic extensions visualized.

We have repeatedly made the mistake of assuming that because the patient had a prominent adenomatous lobe on one side, it was unnecessary to do a mediastinal x-ray. This has resulted several times in our demonstrating intrathoracic goitres on the opposite lobe which were entirely unsuspected at the time of the original examination.

We feel strongly, therefore, that when patients have any of the signs that indicate the possibility of an intrathoracic goitre, respiratory difficulty, the presence of an adenomatous goitre or dilated superficial thoracic chest veins, they should always have an x-ray of the superior mediastinum.

No matter how deep intrathoracic goitres are, practically all of them can be removed. The mortality in the very deep intrathoracic goitres will be a little higher than in the average extrathoracic goitre but not materially so. The mortality from January, 1930 to 1933 in the intrathoracic goitres extending nearly to the arch of the aorta was 1.4 per cent; in those extending to or below the arch of the aorta, it was 2.5 per cent.

Intrathoracic goitre should not occur. Any patient with a goitre which is tending to become low in location should have it examined each year. If there is a tendency for the lower lobes to extend downward into the chest they should be removed before this extension occurs.

Malignancy of the thyroid gland, in our experience is but little understood by many men. It occurs almost entirely as degeneration of a previously existing benign adenoma or adenomata. We know of no clinical method whereby one can determine that a benign adenoma is or is not malignant. There is a time in all benign adenomata which become malignant, at which the malignancy starts but this fact is not clinically demonstrable at this period. Since practically all malignancy of the thyroid does originate in an adenoma which is originally benign, we feel strongly that all discrete fetal or embryonal adenomata—and these are largely the discrete adenomata—should be removed because of the danger of malignancy in them.

It has been demonstrated by Dr. Howard M. Clute in this Clinic that malignancy of the thyroid can be divided roughly into four groups. There is a group in which vessel ingrowth, that is, penetration of the adenomatous tissue through the vascular intima of a blood vessel, can be demonstrated. These, while not frankly malignant, are potentially malignant.

The next group is the papillary adenomatous type of malignancy, a type of carcinoma which is extremely radiosensitive. We have had some excellent results in these cases with x-ray therapy.

The next group are the adenocarcinomas in which there is a tendency for local recurrences, but practically all of which ultimately die. Finally, there is the fourth group in which are found most of the malignant cases, the small round cell carcinomas and the giant cell carcinomas which

metastasize locally and distantly and practically all of which cases also result fatally.

We feel so pessimistic about the results with x-ray, radium or surgery in malignancy of the thyroid that we feel strongly that the salvation of patients with carcinoma of the thyroid is the removal of the adenomata in which the disease arises before malignant degeneration has occurred.

We, therefore, definitely feel that it is wrong for doctors to tell patients with these discrete adenomata that they should not have them cared for until they trouble them, because when they trouble them, as a rule, it is too late to successfully remove them.

I should like to speak to you about another condition concerning which we have repeatedly written, but one which occurs only occasionally in any average physician's experience unless he is dealing particularly with thyroid states in considerable numbers; that is the matter of acute hyperthyroidism or thyroid crises. One must realize that when a patient has hyperthyroidism, he is in a state of hypercombustion, that this hypercombustion can and is frequently combated by the patient by means of increased intake of water and food (fluid and fuel). On the other hand, if the hyperthyroidism (hypercombustion) becomes sufficiently intense, the patient will be unable to take in enough fluid and fuel to counteract the effect of this excessive burning-process. When this occurs, and the patient is unable by fuel and fluid intake to counterbalance this hypercombustion, he or she then begins to burn themselves. This then produces a state of acute hyperthyroidism or what we have termed a thyroid crisis.

We know that there are certain early indications attending a thyroid crisis and that if they can be recognized, measures can be undertaken which will successfully, in most instances, combat this excessive effect of hypercombustion.

There are certain conditions which tend to bring about this state of acute hyperthyroidism or thyroid crises one of the most common of which is infection. When a patient with hyperthyroidism acquires in addition an acute infection such as follicular tonsillitis, an alveolar abscess, an acute appendicitis or any other similar state, the hyperthyroidism is immediately intensified and this intensification can go on to the degree where delirium, vomiting and diarrhea occur—the states which characterize thyroid crises. When, for any reason, vomiting complicates the state of fairly acute hyperthyroidism, factors are then immediately present for the production of a serious thyroid crisis.

If a patient is unable to take in fluids or fuel, the elevated metabolism results in excessive combustion which brings about autocombustion, the patient consuming his own glycogen reserve in his liver. This produces further intoxication and undesirable symptoms, further intensification of the hyperthyroidism and eventually, unless successfully combated, a fatality. Likewise, if patients with hyperthyroidism begin to have a diarrhea, they lose fuel and fluids so rapidly that the state of autocombustion and thyroid crisis may quickly appear.

It is desirable that patients should not be permitted to get into these advanced stages of intoxication with acute hyperthyroidism. For that reason, the onset of such a state should be recognized early and immediate measures undertaken to combat such a situation.

When we have been able to employ the measures to be spoken of, early in the onset of the thyroid crises, we have been able to get most of these patients out of the crises successfully and safely.

The measures to be employed in established and impending thyroid crises are fluids, glucose, iodine, hypnotics and narcotics. When patients show signs of impending hyperthyroidism a Hendon indwelling intravenous needle should be tied in the long saphenous vein above the ankle. By means of this indwelling needle, we have been able to give these patients constantly for twenty-four hours intravenous salt solution drip at the rate of forty to sixty drops per minute. This has permitted us also to administer in these cases continuous intravenous glucose solution up to five, six and seven hundred grams in twenty-four hours. The amount of glucose solution which must be administered is dependent on the height of combustion and whether it is spilled over into the urine. One should employ five per cent glucose solution and not ten, since ten per cent in our experience produces thrombosis and occlusion of the vein.

When we first had to deal with these patients with acute thyroid states associated with vomiting and diarrhea, we were at a loss how to administer iodine to them but we have now learned by its repeated employment that it is possible to give iodine intravenously mixed with the salt solution. We, therefore, introduce fifty minims of Lugol's solution per day in the salt solution, giving it intravenously with the salt and glucose solution.

It is necessary not infrequently, because of the activation in these cases, to employ large doses of morphia and patients with hyperthyroidism will tolerate morphia much better than other cases. Sodium amytal and other hypnotics have also been of value in quieting these cases.

With the continuous administration of fluids and fuel in the form of intravenous salt solution and glucose, the effects of hypercombustion can be offset, these patients can be kept out of crises and in many instances be relieved of crises when they have progressed into them so that the advancing intensity of intoxication can be checked.

Once these patients have merged from crises, contrary to the teaching which used to be in

vogue concerning such thyroid states, that is, that it was unwise to operate on patients close to crises, we have put these patients on high carbohydrate diets, large fluid intake and at the end of two to three weeks, after their rescue from the crises, have instituted a first-stage right subtotal hemithyroidectomy. We have then sent them home for six weeks, at the end of which time they have returned for subtotal thyroidectomy on the remaining lobe.

We feel very strongly that when a patient is relieved of a thyroid crisis, unless something is done in the way of removal of thyroid tissue to check the advance of the disease, he may again go into a crisis and it will not be so easy the next time to rescue him from it. For that reason, we believe from our experience that it is wise to institute a first-stage subtotal right thyroidectomy soon after the patient has been removed from his crisis as a precaution against a return of the crisis.

This is an extremely important state and since it occurs only occasionally in everyone's experience, I believe it is important that family physicians be prepared to handle such emergency states by the methods described above, since if this is not done many of these patients in acute crises will die under the ordinary, less aggressive methods of treatment.

I think I can best close my general remarks on this subject with a discussion of what the end results are and what the mortality rates are in these cases. Dr. H. M. Clute and Dr. J. R. Veil of this Clinic have reported a five-year follow-up study on 97 cases of exophthalmic goitre every one of whom was seen, examined and had a basal metabolism here at the Clinic five or more years after his operation. Of these, 82 patients are perfectly well, requiring no further operation, seven are well with reoperation and removal of more thyroid tissue, three are well with the constant administration of a small amount of iodine and three have myxedema. These are dependable and, I believe, quite satisfactory end result figures in such a serious state.

As stated above, we have now performed twelve thousand, two hundred and forty-six thyroid operations with a mortality in the whole group of 0.73 per cent.

The mortality in the patients with primary hyperthyroidism from 1926 to 1933 was:

Total Cases	Total Operations	Total Deaths	Case Mortality %	Operative Mortality %
3,422	4,543	21	0.61	0.48

The mortality in the patients with toxic adenoma for these same years was:

Total Cases	Total Operations	Total Deaths	Case Mortality %	Operative Mortality %
876	1,032	16	1.8	1.5

One can see from these figures that we have been able to maintain a very low mortality rate in true Graves' disease, exophthalmic goitre or primary hyperthyroidism. I am anxious, however, to point out that the mortality in toxic adenoma will always be a little higher than that of Graves' disease. This is not in my opinion due to the fact that hyperthyroidism associated with toxic adenoma is any more serious in itself but is due to the fact that toxic adenomata occur in more elderly individuals and, therefore, the operation is associated with more generalized damage such as cardiac, liver and kidney lesions.

In conclusion, I would like to say that thyroid surgery is not dangerous surgery when it is undertaken in organized groups. When, however, it is done as casual surgery, such as the surgery of hernia, fibroid, appendicitis and so forth and without organization for its management, the mortality will undoubtedly be high. The preparation of the cases, the type of anesthesia employed, the technical complications and the postoperative care are extremely important points, I believe, in keeping the mortality low in this group of cases and as demonstrated in the follow-up figures. I know of no operation in surgery in which relief is more striking and the end results more satisfactory.

MISCELLANY

VERMONT DEPARTMENT OF PUBLIC HEALTH

MARCH, 1934

Communicable diseases reported to this department during the month are as follows: chicken pox 88, diphtheria 4, measles 308, mumps 24, scarlet fever 68, typhoid fever 2, undulant fever 2, whooping cough 227 and tuberculosis 15.

The Laboratory of Hygiene made a total of 1,628 examinations in March, classified in the following manner:

Examinations for diphtheria bacilli	122
" " Widal Reaction of typhoid fever	31
" " undulant fever	25
" " gonococci in pus	141
" " tubercle bacilli	199
" " syphilis	504
" of water, chemical and bacteriological	41
" " water, bacteriological	210
" " milk, market	170
" " milk, submitted for chemical only	7
" " milk, submitted for microscopical only	95
" " milk, submitted by the Department of Agriculture	1
" " foods	10

Examinations for the courts (autopsies)	0
" " the courts (miscellaneous)	5
" of animal heads for evidence of rabies	2
" miscellaneous	60
Autopsies to complete death returns	3

Twenty cases of gonorrhea and twenty cases of syphilis were reported to the Division of Communicable Diseases. Four hundred and ninety Wassermann outfits and 380 gonorrheal slides were distributed by this division.

Sixty-five patients have been visited in March by the nurses of the Poliomyelitis After-Care Division, eight doctors have been visited and seven social calls made. One patient was admitted to the Massachusetts General Hospital and one patient discharged from this hospital. One patient each has been discharged from the Children's Hospital and the Audubon Hospital in Boston. Fifteen pieces of apparatus have been fitted, four pieces of apparatus repaired or altered and seventeen orthopedic corrections made to shoes. Sales made by the Vocational Worker amounted to $16.41.

The State Advisory Nurse's time has been devoted to carrying on the CWA project for nurses. Eight hundred and fifty-seven pieces of literature and 102 notifications of births were sent out in March.

RECENT DEATH

ROGERS — VERNE MOORE ROGERS, M.D., died September 18, 1933. He was born in Ashland, New Hampshire, January 25, 1867, and was graduated from the Medical College at the University of Vermont in 1897. Dr. Rogers was located in Quechee for a few years, practiced in Middlebury for about three years, after which he returned to Quechee where he practiced until his health failed in 1930.

AN EXTRACT FROM A LETTER OF SIR WILLIAM OSLER*

"The letter closed with this charitable comment on the Semitic invasion of Berlin:

"The modern 'hep, hep, hep' shrieked in Berlin for some years past has by no means died out, and to judge from the tone of several of the papers devoted to the Jewish question there are not wanting some who would gladly revert to the plan adopted on the Nile some thousands of years ago for solving the Malthusian problem of Semitic increase. Doubtless there were then, as now, noisy agitators—prototypes of the Parson Stocker—who clamoured for the hard laws which ultimately prevailed, and for the taskmasters whose example so many Gentile generations have willingly followed, of demanding where they safely could, bricks without straw of their Israelitish brethren. Should another Moses arise and preach a Semitic exodus from Germany, and should he prevail, they would leave the land impoverished far more than was ancient Egypt by the loss of the 'Jewels of gold and jewels of silver' of which the people were 'spoiled'. To say nothing of the material wealth—enough to buy Palestine over and over again from the Turk—there is not a profession which would not suffer the serious loss of many of its most brilliant ornaments and in none more so than in our own. I hope to be able to get the data with reference to the exact number of professors and docents of Hebrew extraction in the German Medical Faculties. The number is very great, and of those I know their positions have been won by hard and honourable work; but I fear that, as I hear has already been the case, the present agitation will help to make the attainment of university professorships additionally difficult. One cannot but notice here, in any assembly of doctors, the strong Semitic element; at the local societies and at the German Congress of Physicians it was particularly noticeable, and the same holds good in any collection of students. All honour to them!"

*This letter written by Sir William Osler, while visiting in Germany in 1884, appears in The Life of Sir William Osler by Harvey Cushing. Volume I:214, 1925.

A STUDY OF FAMILIES WITH CONGENITALLY MALFORMED MEMBERS

The Gynecean Hospital Institute of Gynecologic Research of the University of Pennsylvania is conducting an intensive study of families into which congenitally malformed individuals have been born.

Special interest centers in families in which malformations have appeared in two or more children. Physicians who have knowledge of any such families are urged to communicate with Dr. Douglas P. Murphy, Gynecean Hospital Institute, University of Pennsylvania, Philadelphia, Pa.

PREVENTION OF LITIGATION REQUIRES EARLY AND THOROUGH EXAMINATION AND A CORRECT DIAGNOSIS

BY HENRY F. STOLL, M.D.*

THERE is no question but that the rank and file of the medical profession look askance at medico-legal cases and there is ample justification for this feeling. Any doctor who has been baited, browbeaten and held up to ridicule by some clever attorney who demanded a "yes" or "no" answer to a preposterous question, has no desire to repeat the experience.

Moreover the conflicting testimony of so-called experts who specialize in the litigation field, sometimes makes one question the integrity of the witnesses. Nevertheless, the growth of accident insurance and the advent of compensation laws place an added responsibility upon all of us whether we like it or not.

Since the earliest times, the desire to get something for nothing has been universal, but it has been more flagrant and unashamed since litigation appeared as an easy way to this end. Yet I am convinced that the majority of the litigants, who on careful investigation are found to have no justification for their claims, are honest in their contention.

It is not my intent to discuss the great variety of injuries and diseases that are attributable to industry, but it may be of interest and perhaps helpful to review some of the diagnostic problems that arose in a few cases. They illustrate that litigation with its attendant worry and expense, might often be avoided if the physician first consulted would take sufficient time to ascertain and record all the facts and thoroughly examine his patient.

CASE 1. H. G. L., aged 67, while driving his automobile had a head-on collision with another car; the impact turned his car completely around though it did not upset. He was not conscious of being injured as he got out of the car unaided and went into his house nearby to phone for the sheriff. He worked a day or two after the accident, but almost none since. The natural inference that he had not worked as the result of the accident was found to be incorrect; the real reason being that he had finished the job he was working on and could not get another.

About a month after the accident, he had a drawing sensation in the region of his heart. Two or three months later he lost his appetite and developed nausea, and about six months after the accident, and five months before I saw him, he became very weak and lost about 40 lbs. in weight. He had never been constipated prior to seven months ago. I examined him eleven months after the accident at which time he honestly, and quite naturally, attributed his condition to the collision. He was alert, emotionally unstable and emaciated. Pulse 80; blood pressure 155/85: tenderness was quite marked over the epigastrium especially toward the right, where a sense of fullness was suggested. I suspected that he had a carcinoma of the stomach, but a rectal examination revealed a hard cartilaginous mass just inside the anal sphincter. X-ray suggested a small duodenal ulcer and a filling defect of the rectosigmoidal juncture, thought to be caused by a neoplasm.

Comment: Notwithstanding the fact that his symptoms were chiefly confined to the epigastric region, there was one symptom of great significance, especially in an elderly individual, that I at first overlooked. For the past several months he had been constipated. In every patient past middle life who notes a change in his bowel habit, either the development of diarrhea or constipation, a careful search for neoplasm of the large bowel should be made.

A strongly positive Wassermann reaction complicated the picture. Whether the rectal lesion was malignant or syphilitic, with secondary involvement of the liver, could not be determined, though the former seemed probable. There could be no causal connection between the development of the duodenal ulcer (if he had one) and the accident six months before.

Irrespective of the complaints or the social status of the patient, subsequent embarrassment is often avoided if a rectal examination and Wassermann test are routinely made.

CASE 2. T. K., aged 65, a buffer and grinder for 40 years could no longer work because of pain across his chest, lack of "pep," loss of weight and a cough of six months' duration. Twice tuberculosis had been diagnosed and both times he was sent to a sanatorium, but soon discharged as having no active tuberculosis. Pneumoconiosis was then considered and he claimed compensation, asserting that his symptoms were due to the 40 years of grinding; a rather natural claim in view of his occupation. Further questioning, however, revealed that the pain across the front of the chest was gripping in character, especially if he hurried. He also stated that he thought if he could get rid of the gripping he would also get rid of the cough which was especially bothersome at night.

Physical and roentgenological examination of the lungs revealed neither recent tuberculosis nor pneumoconiosis. The examination of the heart was likewise negative but, from the clinical picture, the diagnosis of arteriosclerotic heart disease was justified.

Comment: Too little time had been spent in eliciting the patient's symptoms. Cough is often one of the earliest symptoms of a failing myocardium. "A grinder for 40 years" has an ominous sound but we have found that the use of emery and carborundum wheels when equipped with adequate exhaust systems, does not cause pneumoconiosis; whereas with the large silica wheel,—the so-called "wet grinding" now rarely used—extensive involvement is frequent.

In all industrial cases, the actual working con-

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ditions should be investigated. For instance, the roentgenograms of a molder who had tuberculosis strongly suggested a co-existing pneumoconiosis. In addition to making the molds with moist sand and pouring the molten metal, he also cleaned the castings. This would hardly seem to incriminate the occupation but on visiting the foundry, I learned that he sprinkled so-called "parting compound" on the mold before pouring, as this made the separation easier. This preparation is almost pure silica. But of more importance was the method used in cleaning castings.

For the most part they were large pieces,—manhole covers, etc. They were placed on a low bench and the operator "scrubbed" them with a wire brush, bending over so that his face was a couple of feet from the casting. The adherent sand had a high silica content and this must have been increased by the particles of "parting compound" that adhered to the metal. Obviously, the amount inhaled must have been considerable.

CASE 3. C. J., aged 46, a night watchman for two and a half years in a typewriter factory could no longer work because of weakness. Benzol poisoning was alleged as one of the ingredients used is what is known as the japanning process. The manufactured articles, after being covered with the enameling solution, were baked in kilns at high temperature. He had lost weight (40 lbs.), had numbness in fingers and legs, diarrhea and occasionally bright blood with the stool. It had been observed that his skin was "yellow".

In addition to ringing the boxes and inspecting the clocks, he made regular inspections of the kilns. Varying amounts of "gas and smoke" were always evident about the kilns and this was occasionally so strong that his eyes would "water" and he would have to put his head out of the window to get his breath.

On examination, a lemon yellow tint to the skin was evident. There was marked weakness in the legs, so that he could not stand unaided. The tongue was very red and, along the edge, seemed denuded of epithelium. Both knee reflexes and the right ankle reflex were absent.

An international authority on industrial diseases testified that the man was suffering from benzol poisoning and a claim for complete, permanent disability was made; yet in reality, there was little to support this claim save the fact that he had a severe anemia and had passed a little bright blood with stool a few times. He had had no petechiae or real hemorrhages which are always present in benzol poisoning. The blood picture was definitely not that of aplastic anemia, such as occurs in benzol poisoning, but was typical of primary anemia. (Hb. 40; R.B.C. 2.3; W.B.C. 5500. Red cells varied much in size, hyperchromia was present and some specimens showed blasts.) Free HCL was not found in either of two examinations of gastric contents; moreover, combined system disease, so common in primary anemia, does not occur in benzol poisoning.

Comment: The inhalation of gases and fumes is frequently the basis of a claim for disability, yet the most lethal gas (CO) is without odor while some with a disagreeable odor, as for example, banana oil, is harmless. The intermittent exposure to benzol fumes in the case of the night watchman was much less than that experienced by the regular workmen in the plant and no case of benzol poisoning had developed during many years of operation.

CASE 4. W. W., aged 57, claimed compensation because of disability due to typhus fever. When admitted to the hospital he complained of pain in the region of the right shoulder accompanied by fever of three weeks' duration. Tenderness was marked and motion was exceedingly painful. He gave a history of having strained his shoulder over six months before while loading railroad ties onto a freight car. The pain gradually subsided but, on the seventh day after admission to the hospital, his temperature rose to 103.4° for one day. For a couple of days he was slightly drowsy. The spinal fluid pressure was normal; there were ten cells and a slight globulin reaction. Wassermann was negative; colloidal gold, a slight rise in middle zone.

Greatly to everyone's surprise, a positive Weil-Felix reaction was obtained on the blood. Up to this time no one had considered the question of typhus fever. Further questioning developed the fact that while working at his trade as a carpenter, about a month before admission to the hospital, and just prior to the development of his symptoms, he was repairing an old house and opened up a large nest of bats that flew about his head. He reached in and with his bare hand removed a large amount of "bat wool". He was not conscious of being bitten by a bat, nor did he recall any insect bites. That night he had a sudden, sharp pain in the back of his neck. He indicated the spinous process of the seventh cervical vertebra. The pain in the shoulder had been present since that time, a period of about four weeks.

European typhus is due to the Rickettsia prowazeki and the vector is the human body louse. Examination of the patient, however, did not reveal any lice. Though the bats are reputed to harbor a variety of mites and parasitic flies they do not, so far as is known, harbor human lice. In this country, however, typhus fever is not transmitted by the body louse but by rats and conveyed to human beings by the rat flea. Unsuccessful attempts were made to capture rats in the vicinity of the old house where the man had worked.

X-ray examination of the right shoulder and spine showed evidence of chronic arthritic changes in the right acromioclavicular joint and advanced hypertrophic changes in the dorsal spine. The urine at all times showed a few pus cells and at the time of the second rise of temperature pus cells were reported as being present in clumps.

Comment: Clinically, he had a typical, acute, periarticular inflammatory process of the shoulder; probably with a complicating bursitis and pyelitis. The mental symptoms suggested a mild encephalitis.

It is quite likely that his work started up an old quiescent arthritis of the shoulder. In the effort to prove that the man was "bit by the louse that fell from the bat, that flew from the house that Jack built," the actual condition, that was probably compensable, was lost sight of and as a consequence, the case was thrown out of court. Valuable as laboratory tests are, one can sometimes be led very far astray unless they are considered in conjunction with the whole clinical picture.

CASE 5. C. L., aged 66, sued a hotel proprietor for $25,000 alleging an attack of ptomaine poisoning with subsequent injury to his heart, as the result of eating food served at the hotel.

The claimant, a retired merchant, spent the winter of 1931-1932 in Florida, returning the first of May. While there he played a great deal of golf and in fact, had been particularly active and in good health. On the morning of May 7, he breakfasted at 7:30 in New York City. He partook of no other food or drink until his luncheon which was eaten in Hartford shortly after three o'clock in company with his wife and two daughters. The question was raised as to the advisability of eating oysters, as it was the month of May. The claimant's luncheon consisted of raw oysters, soup, a piece of chicken with mushroom sauce and asparagus salad. One of the daughters ate the oysters, chicken, ice cream and coffee. His wife and other daughter did not eat the oysters, but the rest of the luncheon was the same.

The entire party was very hungry and the claimant had had nothing to eat for about eight hours. The food, including the oysters, looked to be good and tasted so. While waiting for the waiter to pass the menu for the dessert order, the claimant began to feel ill. He had a vague sickening feeling in the abdomen. He decided to eat no dessert and thought he would feel better if he got out into the air, so without saying anything to the family, arose and walked out of the dining room, through the lobby and out to his car standing nearby. The chauffeur noticed nothing unusual in his appearance. He got his overcoat for him, helped him into it and the claimant got into the back seat unaided. While he was walking out from the dining room, however, he felt very weak and had to "push himself" and he was somewhat unsteady. Almost immediately after getting into the car, the chauffeur heard a peculiar noise and turned around to see him vomiting profusely and for a moment he appeared to be unconscious. His breath came in short gasps and his face appeared to be swollen. The unconsciousness was only momentary.

The other members of the family came out after finishing their luncheon, in perhaps fifteen to twenty minutes. He presented a ghastly color and refusing their advice to summon a physician, immediately started for his home in Springfield. On the way he was nauseated, but did not vomit. He got out of the car at his home unaided, walked upstairs without assistance, to his room and dropped upon the bed. He did not know anything thereafter until he regained consciousness several hours later when he saw a nurse, two doctors and a priest in the room. He remained in bed for four weeks because of weakness. At no time did he suffer from pain, vomiting or diarrhea. His recovery was despaired of when he was first seen. He was very slow to regain his strength and has had to limit his activities greatly since then because of shortness of breath and of discomfort in the left side of the chest on exertion.

At the time of my examination, seven months later, the heart was apparently enlarged slightly to the left; the sounds were faint and there was a soft systolic murmur following the first sound. Pulse 92; blood pressure 150/75. The examination was otherwise negative.

Comment: The claimant was very hungry at the time of the luncheon and ate heartily and within fifteen to twenty minutes after beginning the meal he began to feel ill; "a great weakness", he called it. He suffered from no pain, walked a considerable distance, became momentarily unconscious, vomited profusely but after the initial vomiting there were no gastrointestinal symptoms whatsoever, except for an attempt to vomit on the journey to Springfield.

Food poisoning of any sort could be absolutely ruled out as the time between the ingestion of food and development of symptoms was too short.

During the past few years it has become more and more evident that individuals, especially past middle life, apparently in the best of health who are seized with so-called acute indigestion, usually have an occlusion of a cardiac vessel. This has repeatedly been proved at autopsy and while there is usually pain, which is almost always intense, it is not uncommon for pain to be entirely absent. An overwhelming sense of weakness, accompanied by sweating, appears to be the pain equivalent in this case.

The attacks of coronary occlusion occur so frequently in individuals who are feeling perfectly well, just after or while eating a hearty meal, that it would seem as though there was some connection between the ingestion of food and the attack. One may assume that the coronary circulation is already impaired, due to vascular sclerosis, and that possibly the engorgement of the blood vessels of the gastrointestinal tract, as the result of the ingestion of food, is sufficient to lower the blood pressure in the already sluggish coronary circulation enough to cause thrombosis. The distention of the stomach, with the change in position of the heart, may contribute to this.

When vomiting follows the attack as it often does, it almost invariably brings temporary relief from the pain even though there is no food in the stomach and this naturally suggests the diagnosis of acute indigestion. The relief will usually last only a few moments, but is repeated with each succeeding attack of vomiting. It would seem as if the rise in blood pressure coincident to the strain of vomiting were sufficient to force enough blood through the small collateral vessels to momentarily overcome the muscle anoxemia.

The case here reported was won by the defendant on a point of law, not of fact as to what caused the sickness. The lower court ruled and was sustained by the higher tribunal, that the hotel sells service—not food and consequently does not guarantee its purity.

CONCLUSION: The physician first consulted after an alleged injury has a great responsibility. If he fails to get a complete description of all the details that precede as well as follow the incident; if he neglects to examine the patient with meticulous care; if he makes a thoughtless remark or comment, great harm may result. The fear that a serious condition has arisen, the hope that financial security may be achieved, and the months of uncertainty while the wheels of the law slowly revolve, have wrecked many an individual past any possibility of salvage.

ACROMIOCLAVICULAR DISLOCATION AND ITS REPAIR

BY FREDERIC J. COTTON, M.D.,* AND GORDON M. MORRISON, M.D.*

THE understanding of this dislocation, appreciation of its seriousness, and of the various problems offered in the handling of the injury, have not been helped by the confusion between two lesions different enough to be classed entirely apart.

The common lesion, occurring usually from falls on the shoulder, common on the football field for instance, involves nothing beyond tearing of the ligaments directly connecting the clavicle and the acromion.

Sometimes there is a crumpling fracture of the outer end of the clavicle, but not often. There is a little upward displacement of the upper end of the clavicle, usually only a half an inch or so. Unless there is much muscle spasm this displacement is reducible by shoving the arm upward; particularly with the patient on his back.

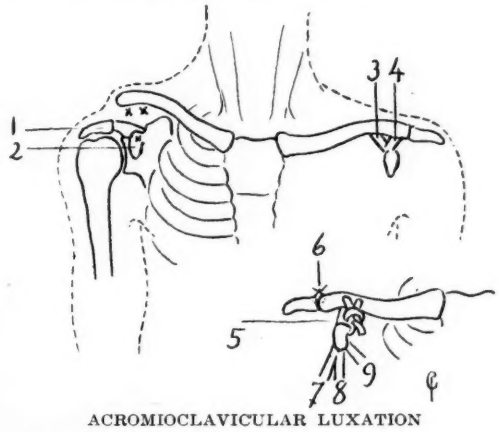
Treatment with any sling or apparatus to hold the whole arm *up* beyond the ordinary carrying point, brings about prompt healing of ligaments with displacement nearly enough abolished to leave no measurable disability, as a rule.

Rarely it may seem advisable to suture the ligaments or to reeve a fascial strip through the bones *across* the joint. This lesion is really hardly important.

The other lesion, from like violence but of severer force, involves not only a tearing of the ligaments about the joint, but also of the massive conoid and trapezoid ligaments holding the clavicle to the coracoid process of the scapula. Such a tear may be so complete as to allow a direct displacement of the outer end of the clavicle upward. In two such cases, rather neglected, I have seen such displacement of at least two to three inches. Ordinarily it is less, but very definitely more than in the lesion first described. The bone-end may be replaced but not easily, and is hard to hold. Such an injury is serious. Mere confinement after reduction is entirely inadequate treatment. Even operation *at the joint* is a waste of time.

Radical operation is the only cure. Various lashings have been used, but to-day one would use only fascia. The only reliable treatment is an operation of obvious mechanics, but one I think not often done. The incision runs from the pectoral insertion on the humerus up to and a bit beyond the clavicle, crossing about an inch and a half inside the outer end. This incision opens directly onto the interval between the deltoid and the so-called clavicular portion of the pectoralis major. Here lies the cephalic vein. Blunt dissection separates the muscles. The vein is carried outward; occasional ties may be needed.

High up in the space the coracoid process presents an obvious hook. From it arise the tendons of origin of the pectoralis minor and the short head of the biceps. Blunt dissection opens up room behind them thereby permitting a circling of the coracoid hook. Directly above this point the clavicle, here broadened out is drilled through but *not* encircled. It is drilled from above downward, a spatula being held beneath



ACROMIOCLAVICULAR LUXATION

1. Acromion.
2. Coracoid.

x x x Torn ends of ligaments on clavicle and on coracoid process.

3. Conoid ligament with normal attachments.
4. Trapezoid ligament with normal attachments.
5. The knotted fascial band *through* clavicle, *around* coracoid, *back* of the attachments of origin of the muscles.
6. Direct suture of torn *acromioclavicular* ligaments.

7, 8 and 9. The short head of the biceps, the coracobrachialis, the lesser pectoral, at their origins.

it, to guard against any slip. The hole is enlarged to a quarter or even a third of an inch.

The fascia, a long and very strong strip, is obtained from the fascia lata in the usual way, cleaned, rolled up to a cord, passed down through the clavicle under the coracoid from within outward (behind the tendons so it cannot slip off) brought up and forward, tied in a square knot with the free end lying in front just below the clavicle. The knot is caught with stitches of chromic gut or silk as usual. Next comes the repair of the acromioclavicular ligaments, probably not very important. After this operation, firm sling support is needed for at least six weeks.

As in all surgery with fascial sutures, there is presently some slack, no matter how tight the fascia is drawn, and how firmly knotted. I have done this operation on about six cases. In all that I have done or observed, thus operated on, the results have been mechanically competent and clinically good. And this applies to several cases operated some weeks after injury.

*Cotton and Morrison—For records and addresses of authors see page 817, issue of April 12, 1934.

CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL

ANTE MORTEM AND POST MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

EDITED BY RICHARD C. CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 20191

PRESENTATION OF CASE

First admission. A married American housewife of forty-two entered on the Neurological Service for the first time complaining of headaches of a year's duration.

A year before admission she began to suffer from severe frontal headaches which occurred on an average of three times a week. They were not accompanied by nausea or vertigo, but were sufficiently severe to make her lie down. At about the time of their onset her physician noticed a tumor in her abdomen, but did not recommend any treatment for it. At the same time she noticed a lengthening of her menstrual periods from her usual three and a half days to eight days. The headaches became gradually more frequent until they occurred daily. They did not change in character. Five months before her entry to this hospital she awoke one morning with blurred vision and an exceptionally severe headache. She entered another hospital, where three lumbar punctures were done with temporary relief of the headache. X-ray studies were made and abscesses about the teeth found. Six teeth were removed. While in the hospital she had severe earaches, but no operation was done on her ears.

Her family history shows that her father was living and well at seventy-five. Her mother died at sixty-three of cerebral hemorrhage. The patient had been married twenty-one years. Her husband was living and well. She had one son, aged nineteen. She had a single miscarriage at the age of thirty.

She had been told that she had malaria from the age of three to six. She had the usual childhood diseases, and also had diphtheria in childhood. She had been constipated all her life, being accustomed to taking cathartics daily.

Physical examination showed a well nourished, rather pale woman with a moderate upper dorsal kyphosis. The heart measurements were within normal limits. The blood pressure was 124/74. The chest was negative. A firm, hard, smooth, non-movable, slightly tender tumor about the size of a pear was felt in the epigastrium, pulsating up and down but not laterally. On auscultation over it a systolic bruit could be heard. The liver edge was barely palpable and slightly tender. Pelvic examination showed a tumor the size of a grapefruit which appeared to move with the cervix. Neurologic examination was negative.

She was afebrile. Her pulse averaged 80 and her respirations 20.

Laboratory examination showed a red blood cell count of 4,120,000, a hemoglobin of 55 per cent, a white cell count of 4,600. The urine showed a specific gravity of 1.012 with no albumin, no sugar, and a negative sediment. The non-protein nitrogen was 24 milligrams. Examination of the colon by barium enema was negative.

A lumbar puncture gave 13 cubic centimeters of clear colorless fluid with an initial pressure of 170. The dynamics were normal. Alcohol and ammonium sulphate tests were negative. Thirty-nine crenated red cells were observed. The Wassermann and colloidal gold were negative.

She was transferred to the Surgical Service, where a dilatation and curettage with an implantation of radium was done under avertin anesthesia. At this time the cervix was found to be smooth and normal in size. The uterus above it was definitely enlarged and somewhat irregular. No masses could be made out in either vault. The cervix dilated easily. The uterine cavity measured four inches in depth. With the curet a localized hump could be made out on the posterior wall. Several smaller nodular irregularities were felt on other portions of the wall. The curettage produced only a small amount of grossly and histologically normal endometrium. Two hundred and thirty-five millicuries of radium were inserted for six and a half hours. Three days later she was discharged with advice to continue under observation with a view to hysterectomy if the bleeding did recur.

History of interval. Following her discharge her headaches continued on an average of three days out of every week. The pain was now described as most severe in the occipital rather than the frontal region. There was general relief at the times of the menstrual periods. She took the iron prescribed for her anemia faithfully and adhered to the other dietary requirements advised. Her color improved and she gained thirteen and a half pounds in weight. Her menstrual periods continued in spite of the radium treatment. Until the last one before her reëntry, however, the flow was relatively scant in amount. Four days before her reëntry she suddenly passed a large amount of bright red blood and numerous clots. The following day this stopped. The day before entry she had another severe hemorrhage, but without further clots.

Second admission, nine months after her previous discharge.

Physical examination at this time was unchanged from the preceding entry. On pelvic examination a slight flow of blood from the external os was noted. The fundus was found to extend three fingerbreadths above the symphysis and seemed about the size of a small orange. The vaults were negative except for marked tenderness on the left.

Her hemoglobin on this occasion was 80 per cent. The red cell count was 4,430,000.

Three days after entry operation was done, a supravaginal hysterectomy, bilateral salpingo-oophorectomy and appendectomy. Following the operation she had persistent vomiting for three days. On the fifth day after operation at about midnight she suddenly complained of sharp severe epigastric pain. There were at the time no other symptoms. The pain was relieved by a grain of codein followed by one sixth of a grain of morphine. At seven o'clock the following morning the patient became suddenly dyspneic and cyanotic and collapsed. When seen by the doctor she was lying in bed showing marked air hunger. Cyanosis was extreme. The extremities were somewhat cold. She was rational and talked intelligently. At this time she had no chest pain. The abdomen appeared distended. No peristalsis could be heard. The veins were not distended. The blood pressure and pulse gradually became imperceptible. The patient became comatose and died fifty-five minutes after the onset of the final collapse.

Differential Diagnosis

Dr. James C. White: On thinking about this patient perhaps the first question to clear up is the matter of these headaches. I should say that they were not typical of migraine. She had blurred vision on only one occasion. The pain shifted from the frontal to the occipital region at the second admission. Could they have been due to any cerebral lesion? I feel that with the negative neurological examination and the relatively normal spinal fluid findings the chances of definite pathology in the brain should be fairly slight. Perhaps the anemia resulting from her uterine bleeding is an adequate explanation of her headaches.

Next we have the problem of the pelvic tumor. I think we must discount the epigastric tumor, because they would have had a chance to feel it at operation, and it was never mentioned except at the first admission on the medical ward. She had, as I gather, an enlarged uterus rather than an ovarian tumor. At the dilatation and curettage they found definite irregularity in the inside of the uterus; in fact a number of irregularities. They found a normal endometrium. If she had had a Shaw type of tumor of the ovary causing bleeding she should have shown hyperplasia of the endometrium. If she had had carcinoma of the uterus they certainly ought to have been able to find it with the curettage. Every now and then, however, a small area of carcinoma can be overlooked, so that this possibility must still be considered with the subsequent course of this patient.

She was given 1500 millicuries radiation. Of course she was so anemic that they were unwilling to do the more usual type of hysterectomy. I should like to know in connection with radiation in what percentage of cases that dosage should cause cessation of ovarian function. I should like to ask Dr. Leland if he feels that this amount of radiation would definitely stop the function of the ovary.

Dr. George A. Leland, Jr.: In a large proportion of the cases, yes, but not in one hundred per cent if you are dealing with ovarian function alone.

Dr. White: If you said ovarian function could always be counted on to stop after this degree of radiation, then we should have to fall back on malignant tumor as the cause of her continued bleeding. The most usual type of neoplasm would be carcinoma, but this would probably have been discovered on curettage. Occasionally sarcoma will cause bleeding, and sometimes sarcoma is associated with fibroids. I think that is still a possibility to be considered. On the law of chances, however, I should say she had fibroid tumors of the uterus and the radiation did not completely stop ovarian function; that she may have had a partial breaking down of one of the tumors without complete destruction, and that this was causing symptoms at the second admission. If she had had any malignant tumor you would not expect her to gain fifteen pounds; nor would it be likely that her hemoglobin and red cell count should return to almost their normal levels.

Operation was done. The removal of the uterus with both tubes and the appendix would be compatible either with fibroids or malignant tumor, so we cannot tell by that what the surgeon found.

The final question comes down to this: why did she collapse on the fifth day after operation? She had a stormy postoperative course. After radiation and the findings that were described it would be very likely that she developed peritonitis after operation. Her symptoms of collapse however are perfectly typical of pulmonary embolism. She became cyanotic, developed severe dyspnea, and her extremities became cold, as is commonly the case in extreme circulatory failure. These observations are certainly suggestive of pulmonary embolus. The fact that she had no pain in the chest would also be perfectly compatible with this diagnosis.

I should like to ask Dr. Boyden about her veins. We are told that the veins were not distended. Does that mean the leg veins or the neck and arm veins?

Dr. A. M. Boyden: I did not see her at that

time, but the note that appears in the record was that the veins were not distended.

DR. TRACY B. MALLORY: I think it is fair to presume it means the neck and arm veins, because statements as to distention of the neck veins and regarding cyanosis appear in every history where there is any question of pulmonary embolus.

DR. WHITE: I think that this is the one vital and essential sign. This patient was alive for almost an hour and they had plenty of time to observe it. With complete shutting down of circulation in the pulmonary artery and dyspnea you must get distention of the right side of the heart. If you fail to detect distention of the large veins in the neck, you cannot logically make a certain diagnosis of pulmonary embolus, even though the other findings are typical. You do not often get it in cardiac infarction, but this woman is too young for coronary occlusion. The fact that she had abdominal distention and absent peristalsis makes me feel that her death was due to a fulminating peritonitis.

CLINICAL DISCUSSION

DR. REGINALD H. SMITHWICK: This patient had multiple fibroids of the uterus and was operated on under general anesthesia. While she was receiving the ether she had some sort of circulatory collapse in the etherizing room. Her pulse became very rapid and feeble and her blood pressure dropped from about 120 to 70 or 80. There was some question as to whether we should go ahead and do the operation or not. She was given a slow intravenous infusion and seemed to improve rapidly, although that fact is rather disconcerting.

On opening the peritoneal cavity we found that it contained a large quantity of fresh blood, bright and not clotted. On rapid exploration of the pelvis the right tube was found to be distended with clotted blood. The appendix was adherent to the right tube and was separated with a little difficulty. On quick observation it looked as though she might have had an extrauterine pregnancy, particularly as the radium had never stopped her periods. At any rate she was in poor condition. A rapid hysterectomy was done, removing both tubes and ovaries and incidentally her appendix, which of course one would not be particularly anxious to do under the circumstances except that being involved with the right tube and ovary it seemed a little wiser to take it out than not. Because of her poor condition no attempt was made to remove all the fluid blood and the wound was closed undoubtedly with a large quantity of free blood.

Her postoperative course was similar to that which is very frequently seen with ectopic pregnancies where not all of the blood is removed at the time of operation because of the condition of the patient and the fact that you do not want to handle the intestines too much. She had a little more temperature after operation than she should have had, but that subsided, and by the third or fourth day we were no longer concerned about her abdomen.

Then the sudden episode happened during the night. I did not see her. She died at about 7.45 in the morning, very suddenly, apparently having a good deal of pain during the night which was not relieved by the medication, as I understand the story. I believe that more emphasis should be placed on difficulty in breathing and cyanosis, which I understand from talking with some who saw her were present from the time of the episode about midnight. Also I think Dr. White has been misled by the statement that the veins were not distended. I did not see her until after she had died and the neck veins were distended very definitely. It seemed to me from the reports over the telephone and on looking at her after she had died that she died a perfectly classical and typical death of pulmonary embolism.

DR. LELAND: In listening to the discussion and the description of this case I noted several very interesting points that may well be discussed. I will mention three of them.

In the first place the question of radium and fibroids,—what radium may be expected to do and what it was expected to do in this particular case. I was on duty at the time this patient was in the neurologic ward. I saw the patient in consultation and felt definitely that with a hemoglobin of 55 per cent surgery should not be attempted. I do not believe it is justifiable to subject a woman to a hysterectomy, either supravaginal or complete, with a hemoglobin below 60. When the cause of hemorrhage is benign, radium may suffice to obviate that hysterectomy, or failing in that will act as a hemostatic sufficiently to permit the patient to build up the hemoglobin. In fibroids of the uterus it is not anticipated that radium will always stop the bleeding. In a submucous fibroid it is never expected that radium will stop the bleeding. Apparently that was just the situation in this case. The surgeon who did the curettage found irregularities in the endometrial canal which were interpreted by him as submucous fibroids.

As regards the dose of radium, 1500 millicuries is sufficient in we will say eighty-five per cent of the cases of fibroids at this age to bring about the menopause, but it is not sufficient in ninety-five or ninety-seven per cent, in which a dose of 2500 millicurie hours is required. I think men who use the lower dose—and there are justifiable reasons why they do use that lower dose—must bear in mind the necessity of a repetition of that dose.

In this particular case, as soon as the submucous fibroids were found an attempt was made

to get the patient into shape for hysterectomy.

The second point was this intraperitoneal hemorrhage, which naturally enough was supposed to be due to an extrauterine pregnancy, although the surgeon must have given some thought to the question of pregnancy following the use of radium. The history shows us that no evidence of extrauterine pregnancy was found. I wonder how we can account for that bleeding. We know that the uterus still bled, and we know that radium has a certain stenosing effect upon the uterus. I offer as a possible explanation that a portion of the uterine bleeding came out through the tube instead of through the external os, due perhaps to a submucous tumor so placed that a partial atresia of the uterus prevented the bleeding from coming down through the cervical canal.

As regards the final point, the cause of death, certainly the immediate rise in temperature, the vomiting and the evidence of diminution in peristalsis all lead one to suspect peritonitis. On the other hand we have the evidence of the physician in charge that on the third day the condition of the abdomen failed to give any concern. In these cases one must always bear in mind the possibility of phlebitis of the ovarian plexus. Such a phlebitis may occur with or without a local pelvic peritonitis and is not infrequently the cause of death by pulmonary embolus. I am inclined to reconstruct the immediate cause of death in this fashion; that there was a local pelvic peritonitis—it is unusual not to find it with such an amount of bleeding—with free blood present at the time of operation; that there was a phlebitis of the ovarian plexus; and that the final termination was due not to spreading peritonitis but to a pulmonary embolus from that ovarian plexus and phlebitis.

Clinical Diagnoses

Leiomyoma uteri.
Intraperitoneal hemorrhage?
Coronary thrombosis?

Anatomic Diagnoses

Operative wound: supravaginal hysterectomy; bilateral oophorectomy and salpingectomy; appendectomy.
Pulmonary embolism.
Hemoperitoneum.
Pelvic peritonitis.
Double ureter, right.

Pathologic Discussion

Dr. Tracy B. Mallory: The surgical specimen which was removed at the hysterectomy showed an enlarged uterus with multiple submucous fibroids, as had been suspected from the time of the first curettage. The tube which was seen at the time of operation and thought to be a ruptured ectopic was considerably dilated and filled with blood. Microscopically this and the other tube showed a very slight degree of lymphocytic infiltration but no very significant degree of chronic salpingitis, no evidence whatever of any decidual reaction and nothing to suggest placentation or embryo formation, so that I think we are reasonably safe in ruling out ectopic gestation.

As Dr. Leland suggests, a hemorrhage from the uterus through a patent tube seems reasonable. According to Sampson's many articles it is common to find during the menstrual periods a certain amount of oozing through the tubes if an exploratory laparotomy is done at that time, and in the case of very severe uterine hemorrhage such as this woman had it might be possible for a very significant amount of blood to pass through the tube into the pelvis.

There was a small paraovarian cyst.

The autopsy showed a very considerable amount of blood in the pelvis and there was no question that this blood was infected, because the pelvic contents had a distinctly foul odor and were slightly purulent in character. There was however no generalized peritonitis. The immediate terminal event was a pulmonary embolism, in all probability from the pelvic veins, since the iliac and femoral veins were entirely free. An incidental finding was a double ureter on the right.

I think Dr. White was at a disadvantage working simply from the record, because that statement as to the lack of distention of the neck veins was probably made at an early period of observation. Very possibly a change was made and there was no note at any subsequent time. I agree with Dr. Smithwick that after death the veins were definitely distended, but I believe that can occur postmortem.

Dr. White: I think we have to go on that—we simply cannot make a diagnosis of pulmonary embolism in the case of a patient who lived as long as she did unless these veins are distended.

Dr. Mallory: There was some doubt, because the diagnosis sent down from the ward was coronary thrombosis rather than pulmonary embolus. So I think the distention was not an important feature of the case at any rate.

A Physician: Where was the pulmonary embolus?

Dr. Mallory: Lying in the pulmonary artery just at the bifurcation—a very sizable one.

CASE 20192

Presentation of Case

A seventy-six year old unemployed Negro entered complaining of acute retention of urine of five days' duration.

For a period of somewhat over a year he had had mild symptoms of urinary obstruction,—

frequency, nocturia, slowness of the stream and some difficulty in starting the stream. He had never noted hematuria or pain. Five days before entry he suddenly developed complete retention, requiring catheterization by his physician. Repeated catheterization was necessary during the subsequent four days. On one occasion this produced slight bleeding.

His past history included an attack of rheumatism thirty years before entry characterized by swollen wrists and ankles. For thirty years he had noted edema of the ankles. Four or five years before entry he had been told that he had heart trouble. For two years he had had slight dyspnea on exertion and had noted occasional dull precordial aching. He had been operated on for a hydrocele. He denied venereal disease.

His wife was dead. He had two children who were living and well. There had been no miscarriages or stillbirths.

No family history could be obtained.

Physical examination showed a well-developed man. The heart was enlarged. A powerful apex impulse could be seen and felt in the sixth interspace two centimeters beyond the midclavicular line. Obscuring the first sound there was a long rough systolic murmur which could be heard all over the precordium. In the aortic area a soft short diastolic murmur was heard which was transmitted down both the right and left sides of the sternum. There is no note as to a thrill. The aortic second sound was greater than the pulmonic. The blood pressure was 150/60. The pulse was regular, the rate 60 to 70. The lungs showed a few moist râles at both bases. The abdomen was distended on admission. There was a large area of suprapubic dullness and the bladder could readily be palpated. Rectal examination showed a prostate enlarged to the size of a large orange, smooth, symmetrical, non-tender. There was bilateral pitting edema of both ankles.

The temperature ranged from 98° to 100°, the pulse from 60 to 80, the respirations from 20 to 25.

The only laboratory work recorded is a single urine examination showing a gravity of 1.010 and the slightest possible trace of albumin. The sediment showed occasional white cells and 8 to 10 red cells. The non-protein nitrogen was 38. The Hinton test was negative.

The patient was placed on constant drainage. Two days after entry a bilateral vasectomy was done.

X-ray examination two days later showed both lung fields clear. The outline, position and respiratory movements of the diaphragm were normal. The heart lay rather horizontal in the chest and was considerably increased in the transverse diameter. The curve of the left ventricle was prominent. The apex was blunted. There was marked increase in the supracardiac shadow due to tortuosity and dilatation of the aorta, the tortuosity being regarded as extreme. Plates of the pelvis showed proliferative changes about the bodies of the vertebrae and also at the points of attachment of several muscle tendons. Several round dense shadows were noted in the pelvis and were regarded as phleboliths. After the dye had been given the kidney pelves failed to fill completely, but as far as made out were not abnormal. The ureters also appeared normal.

On the morning of the sixth day after entry the patient was up and about feeling very well. He went to the bathroom, where he collapsed suddenly, was found unconscious, and was brought back to his bed. He did not appear cyanotic. The veins were not distended. The pulse was fairly strong, the rate 90. The respirations were irregular. He remained unconscious and died in about five minutes, the respirations continuing for several seconds after the heart had stopped beating.

X-ray Interpretation

Dr. Aubrey O. Hampton: This supracardiac shadow is very wide in the anteroposterior view, but if you rotate the patient the shadow almost disappears. That finding is fairly characteristic of extreme tortuosity of the aorta without much dilatation. It does measure 5 centimeters at the arch and it ought to be 3.5 to 4 centimeters, so that there is probably slight diffuse dilatation without obvious aneurysm.

The heart is of the left ventricular hypertrophy type that we see with aortic valve lesions or hypertension.

That is all, except some pleural reaction.

Differential Diagnosis

Dr. William B. Breed: I will not consider the genito-urinary aspect of this case, but will try to divide this second part of the story into two phases. It is interesting to consider first what the underlying cardiac pathology is and later to consider what was the cause of his sudden death.

There are some interesting statements; for one, the attack of so-called rheumatism at the age of forty-six. Rheumatic fever is not common at that age, and the incidence of heart disease following rheumatic fever at that age is low. He also stated that he had edema of his ankles for twenty-eight years before he began to have other symptoms of cardiac failure. I cannot explain that on the basis of cardiac disease. He may have had varicose veins.

The physical examination indicates a very large heart. It shows a long rough systolic murmur obscuring the first sound and heard all over the precordium; also an aortic diastolic murmur. He may have had mild rheumatic heart disease with mitral involvement and aortic regurgitation. We may find that there is some rheumatic pathology, but I should think from the story and the x-ray evidence most of his trouble was arteriosclerotic in origin. It is pos-

sible that if they had focused their attention on the aortic valve they might have found some calcification there by x-ray. So I should say that we shall find chiefly arteriosclerotic heart disease with dilatation of the aortic ring as a background.

What was the cause of his death? I think that cerebral hemorrhage or other process in the head is most unlikely because of the suddenness with which he died. I am not considering that seriously. One is tempted to lay a good deal of emphasis on the possibility of pulmonary infarct, since the attack was postoperative. We are told definitely here again, however, that he did not appear cyanotic, the neck veins were not distended, and he did live for five minutes with a strong pulse and a rate of 90. He may have had a pulmonary embolus, but I am against it.

It is purely a guess as to other possibilities. I think there are two main ones, namely coronary occlusion and dissecting aneurysm of the aorta.

One thing in favor of dissecting aneurysm is the extreme degree of arteriosclerosis with a defect of the aortic valve to the point of giving him aortic regurgitation. It is rather intriguing to make an antemortem diagnosis of dissecting aneurysm. I have never done it. I think it is not done very often. Most cases of dissecting aneurysm have been associated with aortic regurgitation.

If coronary occlusion were severe enough to kill him in five minutes one would not expect to have a fairly strong pulse with a rate of 90 directly after his accident. As I said, however, I think it is purely guesswork as to whether he had coronary occlusion or a dissecting aneurysm. Just as a sporting chance I am in favor of dissecting aneurysm.

Dr. Fletcher H. Colby: There is not much more to be said about the genito-urinary aspect of this case than Dr. Breed has said, except this, that this patient was a colored man of seventy-six. The colored race shows the largest prostates that we see. Sometimes they are huge in size. Uniformly these patients do not do well from operation or even in the preoperative course. There are several reasons for that. The first is of course sepsis. It is extremely common and practically universal in these patients who have been carrying a residual for some time and have been catheterized with a certain amount of trauma. When they come here they are likely to be put on constant drainage either by inlying catheters in the urethra or by an immediate cystotomy done to drain the bladder suprapubically. The presence of an inlying catheter always produces a certain amount of infection. Most of these patients are elderly men and are able to take care of that type of infection. The prostate in this patient was described as being the size of an orange. Along with that one expects an engorgement of the periprostatic plexus of veins. That added to sepsis very often results in a phlebitis of these veins with an extension into the pelvic veins. It is not uncommon at all for such a patient to have pulmonary embolism even though no major operative procedure has been done. I think I remember the cause of death in this case, so it is a little unfair to say that I suspect pulmonary embolism. Certainly the course of events was much more as Dr. Breed described it and the death may have been due to coronary occlusion or heart failure of some sort, but it would not be unusual for such a patient as this who is put on constant drainage to have pelvic phlebitis followed by embolism.

A Physician: May I ask what type of anesthesia was used in doing the operation?

Dr. Colby: The vasectomy was done under local anesthesia.

Dr. J. H. Means: May I mention a colored man who died suddenly? He was not so old as this patient,—in his early fifties. He had worked for me for a number of years. I never had anything to do with his medical care. Apparently he was in perfect health until one day when he went home saying he did not feel well, he went to the toilet and dropped dead. I was interested in learning from the medical examiner's report that all they could find was arteriosclerotic heart disease and a wet brain. I do not understand why these conditions should kill him, nor do I understand what the relationship was. The situation was something like this one.

Dr. Tracy B. Mallory: One certainly sees a certain number of anginal cases in which death is nearly instantaneous, and in nearly all these cases one fails to find a thrombus in the coronary artery, although there is always narrowing and arteriosclerosis.

Dr. Means: Do you usually find a wet brain?

Dr. Mallory: I have not noticed it in two such cases that I have examined.

Clinical Diagnoses

Obstruction of the prostate.
Arteriosclerotic heart disease with aortic regurgitation.

Anatomic Diagnoses

Prostatic hyperplasia.
Operative wound, bilateral vasectomy.
Pulmonary embolism.
Arteriosclerosis, splenic and renal.
Cardiac hypertrophy, hypertensive type.
Chronic endocarditis, aortic, with calcification.
Pulmonary emphysema.
Cortical cysts of the kidneys.

Pathologic Discussion

Dr. Mallory: The anatomic findings in this

case were a fairly marked degree of arteriosclerosis and a calcified aortic valve with definite stenosis and undoubtedly some degree of regurgitation. The coronary arteries were in relatively good shape. The immediate cause of death was a pulmonary embolism which I think undoubtedly came from the periprostatic plexus of veins, which has been a very frequent source of pulmonary emboli in our material. We have had at this hospital one fatal case in which the operation was simply the crushing of a bladder stone through a cystoscope, no other operative procedure at all, and the patient died within four or five days with embolus.

A PHYSICIAN: The death was sudden; was there no distention and cyanosis because of that?

DR. MALLORY: I can only say that there is frequently no mention of cyanosis in these case histories.

DR. HOWARD B. SPRAGUE: Were the aortic cusps rigid?

DR. MALLORY: Not entirely. The calcification was mostly at the base; there was still a little freedom at the margins.

A PHYSICIAN: The note was that the aortic second sound was louder than the pulmonic second.

DR. MALLORY: Yes; that is distinctly unusual, is it not?

DR. SPRAGUE: Yes.

DR. MALLORY: The calcification was not so extreme as in many of the cases we have seen here.

DR. HAMPTON: We have been seeing aortic valve calcification in ordinary films now that we know what to look for, but we could not see it in this case. I am sure that careful fluoroscopy would have revealed the calcification, however.

DR. SPRAGUE: Is there no evidence that this was a rheumatic process on the aortic valve?

DR. MALLORY: That is always difficult to tell. We have a rheumatic history, and I have seen a rheumatic history in four or five of these cases of aortic stenosis in elderly people. His mitral valve was absolutely negative. One must assume either that rheumatic fever occurring in an older age group has a predilection for the aortic rather than the mitral valve or else that it is not rheumatic at all.

A PHYSICIAN: Why should the veins become distended?

DR. JAMES C. WHITE: You immediately get right heart failure, you see. Following the damming up of the circulation in the right heart, the neck and arm veins are the first to become distended.

DR. COLBY: He died pretty quickly.

A PHYSICIAN: There were five minutes.

DR. WYMAN RICHARDSON: May I make a speech, more in connection with the first case than this? I have thought for a long time that pulmonary thrombosis, the thrombosis that leads to embolism, must occur at that time when most factors favor coagulation, and therefore it seems reasonable that this thrombosis may occur during the period of greatest blood stasis. There may be marked blood stasis in the veins during the period of anesthesia and flaccid paralysis because of the fact that the tone of the muscles and the muscular movements do aid venous return; and also at the time of operation, when trauma increases coagulation and when pressure relations are changed in the abdomen. Furthermore, there may be trauma from pressure of instruments. Therefore thrombosis may occur during the period of anesthesia and at the time of operation. It might be true therefore that one might get increased venous circulation by active measures during the period of anesthesia, and thus prevent thrombosis. I have not the brains nor the opportunity to work out this theory. I wonder if anyone else might possibly do something with it.

In regard to this last case, it would seem that sepsis was the important factor.

There have been patients who have died of pulmonary embolism on the operating table before the incision was made.

DR. MALLORY: One does have to bear in mind always the possibility that thrombosis may have occurred before operation. Probably in these prostatic cases that is actually the situation.

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The Massachusetts Medical Society

THE ANNUAL MEETING

PLANS for the approaching meeting of the Massachusetts Medical Society in Worcester are now nearing completion. The meeting will be held June 4, 5, and 6, in the Hotel Bancroft, and the Chamber of Commerce Hall, which is under the same roof. The detailed program will be published in the May 17th issue of the *Journal*, but certain features of the arrangements are of sufficient general interest to warrant editorial comment.

The Local Committee of Arrangements has prepared clinics in the leading hospitals of the city on Monday morning, and it is hoped that a large number of Fellows will arrive in time to attend them. This Committee has also planned a program of entertainment for the ladies. All Fellows of the Society are cordially invited to bring their wives, and are asked to register for them at the Registration Desk in order that they may be welcomed by the Ladies' Entertainment Committee. The balcony of the ballroom has been reserved on Tuesday evening for those ladies who may care to hear the distinguished speakers at the Annual Dinner. Arrangements have also been made for all Fellows and their wives who wish to play golf to do so as guests of the Society.

Of recent years there has been an increasing interest in the Scientific and Commercial Exhibits at the Annual Meetings, and an effort has been made this year to secure those especially worthy of attention. All suitable space on the ground floor of the hotel has been reserved for this purpose. The Commercial Exhibits will be in the main dining room, the lobby, and the assembly of the main ballroom. The Scientific Exhibits will occupy the small ballroom, directly behind the main ballroom, and a large part of the mezzanine floor.

It is hoped that Fellows will avail themselves of the opportunity of examining all of these exhibits at some time during the meeting.

WILLIAM HENRY WELCH (1850-1934)

THE death of Dr. Welch, "Popsy" to a legion of endeared friends, brings to an end a life so full, so gloriously rich in all those qualities of mind and hand, that his passing, sad as it is, seems but an incident in the career of one who lived through an age of great development in medicine, not a little of which was of his own making. To have seen the very beginnings of modern pathology and bacteriology and to have been privileged to bring these gifts to America at a time when enthusiastic colleagues helped in their development, to have found friends and money to inaugurate a great medical school and later a school of public health and an equally eminent one of the history of medicine, were the gifts from the gods to a worthy son. The genius of Welch flowered under such inspiring and nourishing influences. The results of the meeting of a man, opportunities, and the divine inspiration were never better exemplified.

To others will fall the task of depicting his official achievements. Many, moreover, have already paid him just tribute, not perhaps the least those friends who met the world around on his eightieth birthday in 1930 and whose declarations of devotion are ably presented in the memorial volume published by the Milbank Fund. The dedication of the William H. Welch Medical Library, too, brought forth a burst of universal accord to the man whose services to his profession were apotheosized by that building. With all his honors, however, he was essentially a simple man; kindliness, courtesy, and thoughtfulness to others enveloped him like a natural cloak. In his presence his interests al-

ways seemed your interests and no matter how important the event, perhaps even international in its scope, Welch never forgot his intimate surroundings, nor did he ignore the friendly touch, the pleasant word, the cordial greeting. In these respects he was much like Osler, his companion in the Hopkins days and afterwards.

That his work was broad and sound is beyond question. To him, almost alone, America owes the revivification of medicine. The establishment here of pathology and bacteriology was in itself an achievement of prime importance. The grouping of a few great teachers of medicine at Baltimore in the late eighties and the stimulus he gave to each of them, multiplied a hundredfold by their students, was, without doubt, Welch's greatest contribution. Set at a very high standard, the School might easily have foundered had it not been for the supreme figure at its helm. His influence, in those early days, radiated to every corner of the laboratories and hospital, as it later came to penetrate all aspects of medicine and even the life of every citizen of the United States. As years went by, hardly any important problem in medicine, medical education or public health was decided in this country without his sanction. Few men have had a wider outlook or a more penetrating gaze, for he truly, of all men in recent days, "saw life steadily and saw it whole".

Well does the writer of this note remember some memorable nights on the open rear veranda of 13 Norham Gardens, Oxford, with Osler and Welch talking far into the night. The topic at hand concerned the inclusion or exclusion of certain medical worthies in Osler's *Bibliotheca Prima*, then being assembled for the forthcoming catalogue of Osler's library. The great men in medicine offered, of course, no scope for argument, but when it came to some of the lesser figures, like Conrad Gesner, time passed quickly in contemplation and discussion. Rarely could one man mention a fact regarding an historical figure that the other was not perfectly familiar with. The hungry student who sat by was completely overwhelmed, for two giants in medicine had met and he was within hearing. That was fifteen or more years ago and yet the picture stands forth to-day in the writer's mind with the clearness of an etching.

Other events crowd in upon memory: a thoughtful day with Welch in a fifteenth century Cardinal's library in Germany, during the days of the American Army of Occupation; some incidents in an hotel room in London; a few hours at a hospitable home in Switzerland; and glorious days in Baltimore, not by any means least, the fifteenth of February last, when Welch greeted us from his bed, then occupied for over a year, at the Hopkins Hospital. With all these splendid memories, intimate and perhaps relatively superficial, can one separate the man, his work, and his influence?

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

DALAND, ERNEST M. A.B., M.D. Harvard University Medical School 1918. F.A.C.S. Chief of Staff, Pondville Hospital. Chief of Surgical Out-Patient Service, Massachusetts General Hospital. Instructor in Surgery, Harvard Medical School. His subject is "A Study of Two Hundred and Thirty-Six Compound Fractures Treated at the Massachusetts General Hospital." Page 983. Address: 483 Beacon Street, Boston, Massachusetts.

STURGIS, SOMERS H. M.D. Harvard University Medical School 1931. Member of Staff, Out-Patient Department, Cambridge Hospital. Address: 3 Pinckney Street, Boston, Massachusetts. Associated with him is

LUND, CHARLES C. A.B., M.D. Harvard University Medical School 1920. F.A.C.S. Surgeon, Collis P. Huntington Memorial Hospital. Assistant Visiting Surgeon, Boston City Hospital. Instructor in Surgery, Harvard Medical School. Address: 319 Longwood Avenue, Boston, Massachusetts. Their subject is "Leukoplakia Buccalis and Keratosis Labialis." Page 996.

WASHBURN, FRANK H. M.D. Tufts College Medical School 1899. F.A.C.S. Surgeon and Chief-of-Staff, Holden District Hospital. Thoracic Surgeon, Worcester County Sanatorium. Consulting Surgeon, Rutland State Sanatorium, and Harrington Memorial Hospital, Southbridge. His subject is "Operative Surgery in the Pulmonary Tubercular." Page 1006. Address: Holden, Massachusetts.

RICE, G. ARNOLD. M.D. Tufts College Medical School 1916. Ear, Nose and Throat Surgeon, Holden District Hospital. Bronchoscopist to Rutland State Sanatorium, Worcester County Tuberculosis Sanatorium and Louis Pasteur Hospital, Worcester. Consulting Laryngologist to Central New England Sanatorium, Rutland. His subject is "Bronchoscopy in the Sanatorium." Page 1008. Address: Holden Clinic, Holden, Massachusetts.

NADEAU, GABRIEL. M.D. University of Montreal Faculty of Medicine 1928. Senior Physician, Rutland State Sanatorium. His subject is "Bilateral Pneumothorax." Page 1012. Address: State Sanatorium, Rutland, Massachusetts.

LAROCHE, ARMAND. B.L., M.D. University of Montreal Faculty of Medicine 1922. Senior

Physician, Rutland State Sanatorium. His subject is "Evolution of Pneumothorax Therapy." Page 1013. Address: Rutland State Sanatorium, Rutland, Massachusetts.

LAHEY, FRANK H. M.D. Harvard University Medical School 1904. F.A.C.S. Director of Surgery, The Lahey Clinic. Surgeon-in-Chief, New England Baptist Hospital. Surgeon, New England Deaconess Hospital. His subject is "Thyroid Diseases." Page 1016. Address: 605 Commonwealth Avenue, Boston, Massachusetts.

STOLL, HENRY F. M.D. Columbia University College of Physicians and Surgeons 1902. Visiting Physician, Hartford Hospital. Consulting Physician, New Britain General Hospital, Bristol Hospital and Windham Community Hospital. Senior Consultant, Wildwood Sanatorium for Tuberculosis, Hartford, Connecticut. His subject is "Prevention of Litigation Requires Early and Thorough Examination and a Correct Diagnosis." Page 1022. Address: 179 Allyn Street, Hartford, Connecticut.

COTTON, FREDERIC JAY, M.D., and MORRISON, GORDON MACKAY, M.D. See page 817, issue of April 12, for records of authors. Their subject is "Acromioclavicular Dislocation and Its Repair." Page 1025.

AMERICAN COLLEGE OF SURGEONS

SIX months hence we are to have the annual meeting of the American College of Surgeons in Boston.

This annual convocation is always of interest and importance, not only because it means two or three thousand surgeons in Boston (or wherever it may be) but because it connotes a vast quiet movement, a movement toward better standardized, better controlled, more intelligent work in all the hospitals of the land.

The College is but twenty years old, but in its time it has done much.

With coöperation of the American Hospital Association it has, very quietly, reorganized standards of hospitals from coast to coast.

And this has been as the result simply of a universal "showdown", of a careful systematic evaluation of what we had, and an insistence on what we should have in order to serve the common good, professionally.

The first idea of the college was to educate the profession to higher standards.

Much has been and is being done in this direction and the coming meeting is planned not only to show work and results, but to reach the public.

Just as it presently became evident that we must improve hospitals in order to help surgeons' work, thus necessitating the great hospital campaign, so it has become evident that to make our work possible on a rising plane we must first educate the profession, directly.

Therefore, we have seen the College take up branches of work such as are carried on by the Cancer Committee, The Registry of Bone Sarcoma, The National Fracture Committee, The Committee on Health and Hospitalization, and the Committee on Industrial Surgery.

Much good work has been done by these and by their sub-committees, and regional groups.

And the "regional" meetings of the College all over the country have been of rare educational value.

Unfortunately, here in New England, possibly because we have thought that we needed this work a little less and have coöperated less actively, these educational enterprises have been less energetic hereabouts and less obvious. We have perhaps undervalued the College and its work. We can be assured, however, that, the country over, the results accomplished by the College have been profoundly important.

And now comes a further development. In order that we may well serve our public, *the public must be educated.*

And in this coming session, for the first time, are to be stressed the meetings on *private health.*

Public health, vastly important, has its say. What is now to be stressed is the education of John Doe as to what the qualified doctor can do for him, and his.

Come to think of it, this is pretty nearly an untouched field, and this year the College is going to enter it, in earnest.

There is every indication also that the coming session as a clinical session is in no way likely to fall below the high standard previously set.

Organization for the meeting began last October, and not only are the medical schools and the recognized urban hospitals ready to do their full part, but in larger measure than ever before the outlying hospitals are counted on to do their part. The amount of clinical instruction offered at these meetings is rather amazing in bulk and scope.

All this organization is, of course, closely associated with the Central Offices:

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Clinical Bulletin: Dr. Frank R. Ober.

Public Health Meeting: Dr. Alexander S. Begg.
Cancer: Dr. Channing C. Simmons.
Eye and Ear: Dr. Harris P. Mosher.
Urology: Dr. J. Dellinger Barney.
Obstetrics and Gynecology: Dr. Frederick C. Irving.
Nose and Throat: Dr. George L. Tobey, Jr.
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Industrial and Reconstructional Surgery: Dr. Frederic J. Cotton.

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MISCELLANY

ADDED FEATURES OF THE PRENDERGAST PREVENTORIUM

Dr. Nathaniel K. Wood, Chairman of the Prendergast Preventorium Committee of the Boston Tuberculosis Association, wishes to announce to the medical profession that the Prendergast Preventorium, 1000 Harvard Street, Mattapan, is equipped to take care of diabetic children, and children suffering from malnutrition, as boarders. The rates are $10 a week. An extra charge is made to defray the actual cost of insulin used on each diabetic child.

AN INSTITUTE ON HEALTH EDUCATION IN THE SECONDARY SCHOOLS

The Massachusetts Tuberculosis League and The Southern Middlesex Health Association have issued invitations to attend an Institute on Health Education in the Secondary Schools to be held on Saturday, May 12, at the Winchester High School, Main Street and Mystic Valley Highway, Winchester, Mass.

The morning session will begin at 10:30 at which Dr. C.-E. A. Winslow of Yale University will deliver an address on "Cultural Objectives of Health Education."

Buffet luncheon at 12:00. Afternoon session 1:00 to 2:30.

RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR MARCH, 1934

Measles reached its highest reported incidence for Massachusetts.

Diphtheria and typhoid fever give every indication of running lower this year than ever before.

Lobar pneumonia and scarlet fever show nothing remarkable.

Pulmonary tuberculosis and whooping cough were reported in slightly higher figures than for March, 1933.

Epidemic cerebrospinal meningitis, mumps, chicken pox, tuberculosis other forms and anterior poliomyelitis show nothing remarkable.

RARE DISEASES

Anterior poliomyelitis was reported from Boston, 1; Revere, 1; total, 2.

Anthrax was reported from Salem, 1.

Dysentery (amebic) was reported from Fall River, 2; Ipswich, 1; New Bedford, 1; Salem, 1; Worcester, 1; total, 6.

Dysentery (bacillary) was reported from Lawrence, 2; Taunton, 1; total, 3.

Encephalitis lethargica was reported from Clinton, 1; Lawrence, 1; Stoneham, 1; Westfield, 2; total, 5.

Epidemic cerebrospinal meningitis was reported from Boston, 2; Cambridge, 1; Northampton, 1; Peabody, 1; Southbridge, 1; Springfield, 1; total, 7.

Malaria (therapeutic) was reported from Taunton, 1.

Septic sore throat was reported from Beverly, 2; Boston, 5; Brookline, 1; Foxboro, 2; Haverhill, 1; Malden, 5; Medford, 5; Milford, 1; Salem, 1; Topsfield, 1; total, 24.

Tetanus was reported from Fall River, 2.

Trachoma was reported from Boston, 2; Revere, 1; total, 3.

Trichinosis was reported from Dedham, 1.

Typhus fever was reported from Lynn, 1.

Undulant fever was reported from Southbridge, 1.

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

MONTHLY REPORT FOR MARCH, 1934

Disease	Mar. 1934	Mar. 1933	Average*
Anterior Poliomyelitis	2	1	2
Chicken Pox	1004	1505	1058
Diphtheria	64	86	215
Dog Bite	499	388	366
Epidemic Cerebrospinal Meningitis	7	2	12
German Measles	57	46	264
Gonorrhea	487	476	492
Lobar Pneumonia	552	418	601
Measles	9891	1547	2265
Mumps	644	1098	929
Scarlet Fever	1209	1912	1685
Syphilis	376	364	349
Tuberculosis Pulmonary	424	353	426
Tuberculosis Other Forms	43	45	48
Typhoid Fever	3	8	10
Undulant Fever	1	0	0
Whooping Cough	1969	1135	1055

*Average number of cases for March during the preceding five years.

DR. PHANEUF ADDRESSES THE MEDICAL SOCIETY OF THE COUNTY OF NEW YORK

Dr. Louis E. Phaneuf addressed the Medical Society of the County of New York on Monday evening, April 23, the subject of his address being "The Diagnosis and Treatment of Placenta Previa."

CORRESPONDENCE

TWO QUESTIONS RESPECTING ARTIFICIAL INSEMINATION

Editor, *New England Journal of Medicine,*

During the past week a quantity of most unfortunate publicity has been given by the lay press to the subject of artificial insemination, under the ridiculous caption of "test-tube babies". I call this publicity unfortunate, because it is inevitably destined to raise among childless people false hopes which are doomed to disappointment. Since Morris Fishbein has seen fit to mention a published paper of mine in this connection, I have been drawn more or less into the discussion. I should like, therefore, to make certain facts clear.

Two distinct questions must be considered. The lay press, with its characteristic preference for sensationalism rather than accuracy, confuses the two. They are, as a matter of fact, entirely separate. The first is the value of artificial insemination simply as a therapeutic measure in sterility. The second is the propriety of artificially introducing semen from an alien donor into the wives of hopelessly sterile husbands or into unmarried women.

The first question is medical, and may be definitely answered. If natural intercourse allows the penetration of normal spermatozoa into the uterus, then no extra advantage whatsoever is to be gained by artificial insemination, and certainly no mysterious miracle can be wrought by such means. If, however, there is hypospadias, or impotence, or extreme dyspareunia, or an obstinate hostility of the endocervical mucus, then artificial insemination may be used to overcome the obstacle. I have found it advisable to employ this method in five cases of sterility out of some 800 cases seen and treated in the past fifteen years.

The second question is basically sociologic, though legal and moral issues are raised by certain polemicists in the present discussion. If an intelligent woman seriously decides that she wants to have a baby by a man other than her lawful husband, I should say only that the worthiness of her purpose and the best manner of its accomplishment are matters upon which different opinions may reasonably be held. Dogmatic pronouncements upon such a subject are particularly unconvincing.

SAMUEL R. MEAKER, M.D.
475 Commonwealth Avenue, Boston, Mass.

ANOTHER VIEW OF AN EXPENSIVE DISEASE!

Editor, *New England Journal of Medicine,*

In the *Journal* of April 12, 1934, there appeared a letter from Frank H. Dunbar, M.D., under the heading "An Expensive Disease." I should like to make the following comments on that letter:

In the first place, Dr. Dunbar's figures are misleading if not erroneous. He leaves the impression that but two cases from the town of Mansfield were treated at the Bristol County Hospital in 1933 and that the total hospitalization was 107 days. The fact is that four patients from Mansfield were treated at the Bristol County Hospital in 1933 for a total of 366 hospital days. In his calculations he excluded two patients because they themselves paid a weekly charge of $9.10 and he failed to mention that the town receives subsidy from the state for every case of tuberculosis hospitalized. In addition to the four hospitalized cases, 22 other cases from Mansfield were examined and x-rayed in the Out-Patient Department and five more examinations with x-ray were given to follow-up cases, without any additional charge to the town. These facts were not considered by Dr. Dunbar. In other words, in estimating the cost he employed simple arithmetic, but faulty mathematics to arrive at a wrong answer. I should like to state that one of the cases from Mansfield had the benefit of major surgery (thoracoplasty) which resulted in marked improvement in the patient's health and gives promise of a cure. There is no added charge to the town for this major surgery, the value of which should not be lightly estimated. But there is another and more important aspect to this question. Tuberculosis is a widespread disease, very devastating in its effects on the health of the nation, being still the major cause of death in young and middle-aged people and its continuance is largely due to the spreader or open case in the community. One open case removed from a town and properly cared for in an institution insures some degree of protection from tuberculous infection to others in that community. Dr. Dunbar's method of figuring the cost of the care and treatment of tuberculosis is not greatly unlike that of a man who has to insure his employees and then at the end of the year should one accident occur, makes a mathematical computation to show how costly that accident was. In other words he takes no account of any other values involved.

Massachusetts can be proud of what she has accomplished in the campaign against tuberculosis. She is today, due to wise leadership, supported by progressively thinking people, foremost amongst the states in anti-tuberculosis work and I venture to state that of all the undertakings to which people of this country contribute by way of taxation, not one has given a richer reward or greater returns for the investment than anti-tuberculosis work which includes the tuberculosis hospitals.

The mortality rate from pulmonary tuberculosis in the Bristol County Tuberculosis Hospital Zone dropped from 86 per 100,000 in 1928 to 49 per 100,000 in 1932, a decrease in mortality of 43 per cent in the four-year period. No thinking person will deny that hospitalization and modern methods of treatment in the hospital have contributed largely to this reduction in mortality. Has the price been too great?

Finally it must be remembered that when a sin-

gle case of tuberculosis is hospitalized and properly taken care of (granted that the cost for the individual case is great) not only the patient benefits but the community, and not alone the community of to-day but that of the years ahead.

Yours truly,

GARNET P. SMITH, *Superintendent*,
Bristol County Hospital,
Attleboro, Mass.

April 28, 1934.

A TRIBUTE TO DR. WILLIAM HENRY WELCH BY DR. JOSEPH H. PRATT, 270 COMMONWEALTH AVENUE, BOSTON, MASS.

May 6, 1934.

Dr. Welch had so long been the recognized leader of the medical profession in this country that even men who graduated toward the end of the last century know no other. To many Dr. Welch, in the eminence of his position in medical affairs, seemed more like an institution than a mere man. All those who had the happy fortune to know him must have been impressed with his modesty, simplicity, and kindliness. "Some men mellow with age," said Sir Andrew Balfour, "but Welch, I think, must have been born mellow and his mellowness has merely ripened with the years."

Urbanity he certainly possessed and with it that equanimity of spirit which Dr. Osler extolled so highly. He had that quality of detachment that enabled him to accomplish great reforms in medical education without stress and strain and without passion. He criticized the existing order only indirectly by suggesting something better. His early career shows the courage of the man and his indifference to material gain. He turned aside from the allurements of clinical medicine to be the first American to devote his life to pathology. This was a bold step as he had no money and the teaching of pathology, which paid next to nothing, was looked upon simply as a stepping-stone to clinical professorship and a consulting practice.

He had the courage to leave his own school, "P. and S." in New York, then locally supreme in medicine, and to join the faculty of Bellevue as the latter school offered him three rooms for a laboratory, and the former nothing.

Later he had the courage to leave metropolitan New York and move to provincial Baltimore. When he did so his friends said he probably would become a connoisseur of terrapin and old Madeira but that his development as a pathologist would suffer. At that time, 1884, there was no Johns Hopkins Hospital and no Johns Hopkins Medical School. Five years later the hospital was opened, and ten years elapsed before he could resume the teaching of pathology to undergraduate students. In Baltimore he had the courage and faith to plan an ideal medical school with entrance requirements so much higher than existed anywhere else in the world that some doubt was entertained whether more than a handful of students would apply for admission.

His plan was accepted from a number submitted and the School began its first year with eighteen students. The pathological building on the hospital grounds with the addition of two stories was all there was to the medical school. Laboratories of anatomy, physiological chemistry and physiology were all housed in that building until a new one was constructed the following year.

During his New York days he resisted two temptations that reveal something of the character of the man. He had been less than six months at Bellevue when the alumni of the College of Physicians and Surgeons raised money for a pathological laboratory and the direction and use of this laboratory were offered to Dr. Welch. He declined the post and with characteristic helpfulness suggested the name of his friend Prudden whom he considered best qualified for the position. In a letter to Prudden, fortunately preserved, and quoted by Dr. Flexner in his delightful biographical sketch of Welch, he wrote: "Dr. Delafield proposed that I should go as his first assistant and have charge of the histological department and assist him as much as necessary in the pathological part. The salary was to be five hundred dollars for the first year, and I believe more subsequently. I was naturally delighted with the offer, and thought it was just what I wanted, an opportunity to work in the direction where I had studied most. Upon speaking of the matter before coming to a decision, with some of the professors at Bellevue, I find they are reluctant to have me leave there, and even represent it as not the square thing for me to go at present. The latter motive especially has influenced me to stay, as I do not believe it pays to do anything unfair. I feel as if I were relinquishing a great opportunity and do not see any equivalent for it at present at Bellevue."

It was not long before Dr. Welch found great favor with Prof. Austin Flint, the leading American physician of that generation. He wrote the sections on pathology for the fifth and sixth editions of Flint's book on the practice of medicine, then the leading American textbook. Dr. Flint wrote clearly and well and Dr. Flint insisted that Dr. Welch's style of presentation was so similar to his own that he had difficulty in deciding whether he or Welch had written certain sections. Dr. Flint wanted Welch to be his successor, and would have made him clinical professor of medicine but Welch declined to be considered for the position as it would have blocked the advancement of E. G. Janeway. When told of this incident by Dr. Welch, I gained the impression that Dr. Janeway never knew that he owed his professorship at Bellevue to the self-sacrifice of his friend.

Dr. Welch was the first dean of Johns Hopkins and to him I appealed when I sought to enter the school. He was loath to admit anyone to advanced standing as he felt that if the school was to attain its high goal, better instruction must be given than was obtainable in any other institution existing at that time. Contact with men, not courses and credits counted with him. The fact that I had worked a year with Professor Chittenden "merited special consideration in your case," Dr. Welch wrote me

and as Prof. Chittenden was willing to say a good word in my behalf I was admitted to the second year class and had the privilege of taking my courses in pathology and bacteriology under Dr. Welch.

The first day he met our class, which numbered twenty-five, he demonstrated the organs obtained that morning at autopsy from a case of acute miliary tuberculosis. His manner of demonstration made the tubercle and tuberculosis seem to me a most fascinating subject of study. I had never had a teacher make anything appear so interesting. I recall vividly my feelings as I walked out of the room and down the street. As I had not met any of my classmates, no one disturbed my thoughts. I was convinced by what I had seen and heard that I had made no mistake in coming to Johns Hopkins. The famous saying in regard to Mark Hopkins came to my mind and I thought then, and I think now, that William H. Welch on one end of a log and a student on the other would make a medical school.

During that academic year of 1895-96 Dr. Welch gave himself without stint to the students taking his courses in bacteriology and pathology. I took full notes of his lectures and demonstrations and when bound they made two goodly sized volumes. Fortunately they are preserved and these abstracts of his lectures indicate the wealth of knowledge he gave to his students, and give clear indication of the interesting and systematic way in which he presented the subjects taught. I recall that my friend and classmate, Walter Steiner, was able to take better and fuller notes. Two years ago a volume of notes taken by students of Virchow's lectures was published and presented to the members of the German Pathological Society at their annual meeting. It has been suggested that a similar memorial volume might be compiled of Welch's lectures.

At the end of the academic year on the eve of my return to New England, Dr. Welch gave me a letter of introduction to Dr. Councilman in which he expressed the hope that I might work that summer under Dr. Councilman's direction. This letter accomplished much for me, as it opened wide the door of opportunity to work under Dr. Councilman. An enthusiasm for the study of pathology instilled by Dr. Welch made that summer a very happy one. Work done for the love of it was rewarded by an offer from Dr. Councilman, before my return to Baltimore, of a position in his laboratory on my graduation. The lure of pathology as it was studied in the laboratories of Welch and Councilman was so great that I accepted the opportunity for further training without hesitation. Dr. Councilman became my guide and teacher and one to whom I could always turn for help and advice knowing he would never fail me. For this highly prized friendship I owe a great debt to Dr. Welch.

The following year, as my funds were low, Dr. Welch made me a student assistant in his laboratory and thereby enabled me to see the work of his department at close range. All the details of the work were in the hands of Dr. Flexner and it was he who did the autopsies. Dr. Welch rarely came to the laboratory until the early afternoon unless a lecture was scheduled. In the mental picture of those days I see him as a kindly serene gentleman seated before the microscope of one of the assistants unhurriedly studying a specimen and at the same time asking and answering questions. He is smoking a cigar and wearing street clothes unprotected by a laboratory coat. He seemed to me more like an interested visitor than the laboratory head to which office I, the lowliest worker there, assigned in my mind Dr. Flexner. Dr. Welch's ability to work without haste and without waste is shown by the fact that a bibliography of his published writings prepared in 1920 listed 411 articles.

Rumor had it that he read far into the night and that breakfast and luncheon were a combined meal. His lodgings were on the second floor of a house on St. Paul Street and he took his meals at the Maryland Club nearby. His study was lined with books. On my first visit to his chambers he showed me Hirsch's Biographisches Lexikon in six volumes and so impressed me with its value that I bought a set as soon as one was available.

The last time I saw Dr. Welch was at a luncheon in Baltimore in the fall of 1932. He seemed so alert mentally and he appeared so young for his years that I was moved to tell him that he seemed no older than he did when I sat at his feet as a student thirty-seven years before. "That does not prove a thing," he said, "I may have been senile then."

Dr. Welch with characteristic modesty claimed that what he accomplished was largely due to good fortune in arriving on the medical scene at the time he did. If he had begun his life work twenty years earlier it would have been impossible, he claimed, to have established pathological laboratories in this country. If he had arrived twenty years later the work would have already been done by others. It is known, however, that opportunity favors the prepared mind. Leaving native ability aside, no one was so well equipped by education and training as was Welch when he took up his work in New York in 1878. He had graduated third in his class of one hundred and eleven at Yale. After matriculating in medicine at "P. and S." he took the unusual step of interrupting his medical studies to return to New Haven where he spent a year in the study of science, devoting most attention to organic chemistry. During his interneship of eighteen months at Bellevue he learned much morbid anatomy from association with Delafield and Janeway. He spent two years abroad where he first studied normal histology under Waldeyer at Strassburg and later worked with Ludwig at Leipzig. In the second year he carried on his important investigations on the cause of pulmonary edema under Cohnheim in Breslau. There he met Koch, then a general practitioner but doing epoch-making work in the study of the anthrax bacillus. There also he gained much from Weigert

and Ehrlich who were fellow workers in Cohnheim's laboratory. Before returning to America he did more work in experimental pathology under von Recklinghausen.

Our debt to Welch was well expressed by Osler when he wrote, "No man of his generation in the United States has so deeply influenced the profession, not only by his administrative ability and his stimulating work in pathology, but much more by a personal, unselfish devotion to its highest interests."

RECENT DEATHS

ENSWORTH—WILLIAM HOWARD ENSWORTH, M.D., of 40 Princeton Street, East Boston, died at his home, May 3, 1934. He was born in East Boston, October 13, 1865, the son of Charles P., and Hannah Howard Ensworth. His early education was acquired in the schools of East Boston, and he graduated in medicine from the Harvard Medical School in 1888. He joined the Massachusetts Medical Society in 1888, and was a Fellow of the American Medical Association. He was active in Masonic circles.

He is survived by a sister, Mrs. Adelaide Gouge of Halifax, Nova Scotia, and a nephew, Marcus Ensworth of Watertown, Massachusetts.

RIPLEY—WILLIAM LITTLEFIELD RIPLEY, M.D., of 9 Oak Square, Brighton District, Boston, Massachusetts, died at his home, May 1, 1934. Dr. Ripley was born in Boston in 1872, the son of Eliab and Frances Littlefield Ripley and among his ancestors was Elder Brewster of the Mayflower.

His premedical education was acquired at the Worcester Academy and Tufts College, and he received his M.D. degree from Tufts College Medical School in 1903.

He was a Fellow of the Massachusetts Medical Society having joined in 1903.

He had taught physiology at Tufts for a short time and carried on a large general practice with especial interest in x-ray work.

He was a member of the Ancient and Honorable Artillery Company, the Fusiliers, the Army and Navy Club, the Presentation Club of Brighton, the Catholic Order of Foresters and the Newton lodge of Elks.

He is survived by his widow, Mrs. Alice Turnbull Ripley; eight children, William, Franklin, Miss Geraldine, Robert, Miss Stella, Miss Virginia, Charles and Vincent. A brother and sister also survive him.

OBITUARY

A TRIBUTE TO ARTHUR L. CHUTE, M.D.

In the death of Dr. Arthur Lambert Chute, which occurred on January 12, 1934, the New England Branch of the American Urological Association loses one of its most distinguished members and many of us, the valued friend and counsellor of many years.

Dr. Chute was one of the earliest of the Boston members of the American Urological Association and a founder of the New England Branch Society. He had served as President of both of these organizations, as well as President of the American Association of Genito-Urinary Surgeons, and Chairman of the Section of Urology of the American Medical Association.

He early gave his attention to the study of urological conditions and was one of the first men in Boston to specialize definitely in this branch of Surgery. Some of the earliest, if not the first cystoscopic examinations and ureter catheterizations by the indirect method made in Boston, were done by him at the Boston Dispensary.

He was a tireless worker, a clear thinker, and a prolific writer. His publications were all along clinical lines and based on extensive personal experience and observation. He was among the first to stress the importance of pre-operative treatment of prostatics, the free use of hypodermoclysis and the two-stage prostatectomy. He was also among the earliest and staunchest advocates of spinal anesthesia in prostatic surgery. One of his outstanding traits was a most useful and wholesome skepticism of new and untried methods, although among the first to adopt anything of proved worth.

He rarely missed a medical meeting and one of his greatest pleasures was contact with his colleagues, where his geniality, his sense of humor, and his keen and kindly comments made him a delightful companion. His ideals and standards were of the highest, and his devotion to his patients, his practice, his family, and his friends, is an example and inspiration to all who knew him.

He is survived by his widow and three children: Dr. Richard Chute of Boston; Mrs. Samuel McMurtrie of New York, and Oliver Swift Chute of Whitinsville, to whom the members of the Society offer the most sincere sympathy in their as well as our own irreparable loss.

RICHARD F. O'NEIL,
BRYANT D. WETHERELL,
Committee on Resolutions.

REPORTS AND NOTICES OF MEETINGS

SUFFOLK DISTRICT MEDICAL SOCIETY

The Annual Meeting of the Suffolk District Medical Society was held on April 25 in John Ware Hall. The meeting was called to order by Vice-President Means at 8:25 P.M.

The usual reports of the Treasurer and Auditing Committee were read and accepted.

The report of the Nominating Committee was accepted and the Secretary was instructed to cast one ballot for the officers of the society as listed:

President: Robert L. DeNormandie.
Vice-President: Conrad Wesselhoeft.

Secretary: George P. Reynolds.

Treasurer: John Rock.

Commissioner of Trials: Channing Frothingham.

Councilor for the Nominating Committee: Lincoln Davis; Alternate, Reginald Fitz.

Committee on Supervision: Thomas H. Lanman, Joseph Garland.

Auditing Committee: F. C. Newton, C. C. Lund, Conrad Wesselhoeft.

Censors: Horace Binney, George L. Tobey, Jr., Gerald Blake, William B. Breed, Fletcher H. Colby.

Councilors: A. W. Allen, A. E. Austin, J. W. Bartol, G. H. Bigelow, H. Binney, G. Blake, W. B. Breed, W. J. Brickley, J. E. Briggs, C. S. Butler, D. Cheever, R. C. Cochrane, F. H. Colby, F. J. Cotton, W. P. Cross, L. Davis, G. P. Denny, R. L. DeNormandie, W. H. Ensworth, R. Fitz, C. Frothingham, G. L. Gately, H. W. Goodall, R. B. Greenough, J. Homans, H. T. Hutchins, E. P. Joslin, F. H. Lahey, R. I. Lee, G. A. Leland, G. B. Magrath, J. H. Means, T. J. O'Brien, A. K. Paine, F. W. Palfrey, W. S. Parker, W. F. Regan, G. P. Reynolds, W. H. Robey, G. C. Shattuck, W. R. Sisson, Louisa Paine Tingley, G. L. Tobey, Jr., J. R. Torbert, H. P. Towle, S. Warren, F. A. Washburn, C. Wesselhoeft.

A. W. Allen,
R. C. Cochrane,
H. T. Hutchins,
W. B. Breed,
J. P. O'Hare,
Nominating Committee.

It was voted that the Committee on Social Meetings be abolished as it has no duties.

Dr. Abraham Myerson then gave a most interesting and scholarly talk on the subject of criminal responsibility. The discussion was opened by Drs. Briggs and Overholser.

The meeting adjourned at 10:45 P. M.

THE MASSACHUSETTS SOCIETY FOR SOCIAL HYGIENE

The Annual Meeting of the Massachusetts Society for Social Hygiene was held at the Parker House, April 26, 1934.

The officers elected for the ensuing year are as follows:

President: Dr. E. Granville Crabtree.

Honorary Vice-President: Dr. George H. Bigelow.

Vice-President: Mrs. Maida H. Solomon.

Secretary: Miss Elizabeth Ross.

Treasurer: Mr. William Wadsworth.

The directors chosen are as follows:

Dr. Harold L. Leland, Herbert C. Parsons, Dr. George Gilbert Smith, Mrs. Eva Whiting White, Dr. Gaylord W. Anderson, Dr. Wilson G. Smillie, the Rev. Vincent L. Bannett, Dr. Harry W. Goodall, Mrs. Augustus Hemenway, Dr. Alonzo K. Paine, Richard C. Paine, and Dr. A. Warren Stearns.

ANNUAL MEETING OF THE AMERICAN ASSOCIATION FOR THE STUDY OF GOITER

This meeting will be held in Cleveland, Ohio, June 7, 8, 9, 1934.

Scientific sessions are open to any members of the medical profession in good standing.

Registration fee $2.00.

For details of the program apply to Dr. J. R. Yung, Terre Haute, Ind.

NEW ENGLAND HEART ASSOCIATION

The next meeting of the New England Heart Association will be held in the Peters House of the Rhode Island Hospital, Providence, R. I., Monday, May 21, at 8:15 P.M.

All members of the New England Heart Association and interested physicians are invited to attend.

Special Lectureship Under the Auspices of the New England Heart Association

Dr. Frank N. Wilson of the University Hospital, University of Michigan, will give two lectures at the Boston Medical Library (John Ware Hall) at 4:30 P.M., May 24 and 25, 1934.

May 24. When Is an Electrocardiographic Examination Indicated and What Sort of Help Can It Give?

May 25. The Electrocardiographic Diagnosis of Myocardial Infarction.

Physicians and medical students are invited to attend.

Annual Meeting, Friday, May 25, at 4:00 P.M.

NEW ENGLAND PHYSICAL THERAPY SOCIETY

Annual Meeting

The annual meeting of the New England Physical Therapy Society will be held in Sprague Hall, Boston Medical Library, 8 Fenway, at 8 P.M., on Wednesday, May 16.

Program*

Subject: Physical Medicine.

(a) Electrotherapy (with motion pictures). William D. McFee, M.D., Boston.

(b) Electrosurgery. Halsey D. Loder, M.D., Boston.

Discussion will be opened by Franklin P. Lowry, M.D., of Newton, and Lester R. Whitaker, M.D., of Boston.

Prior to the program there will be a brief business session at which officers will be elected for the ensuing year, and such other matters considered as may properly come before the annual meeting.

The Executive Council will meet at 7:45 P.M.

Members are asked to note the *change in place of meeting.*

*In charge of Dr. William D. McFee, M.D.

All members of the medical profession are cordially invited to attend and participate in the discussion.

ARTHUR H. RING, M.D., *Secretary.*

BERKSHIRE DISTRICT MEDICAL SOCIETY

The Berkshire District Medical Society will hold its annual meeting at the Berkshire Hunts Club at Lenox on the evening of May 14. Dinner will be served at six-thirty.

The speaker on this occasion will be Dr. John St. John of New York. The subject, "A Twenty-Five Year Study of Cancer of the Stomach."

HUGH J. DOWNEY, M.D., *Secretary.*

THE NEW ENGLAND ROENTGEN RAY SOCIETY

The May meeting will be held Friday night, May 18, 1934, at the Boston Art Club, Boston, Mass., at 8 P.M.

The Annual Dinner will be held at the Boston Art Club at 6:45 P.M.

SCIENTIFIC SESSION

"The Value of Roentgenography in the Diagnosis of Laryngeal Disease." Chevalier L. Jackson, M.D., Philadelphia, Pa.

THOMAS R. HEALY, M.D., *Secretary,*
370 Marlborough Street, Boston, Mass.

THE HARVARD MEDICAL SCHOOL ALUMNI ASSOCIATION

The Annual Meeting of the Harvard Medical School Alumni Association will be held Saturday, May 12. Ward rounds (10 a.m. to 12 m.) and operations will be held at the Peter Bent Brigham, the Massachusetts General and the Boston City Hospitals. A business meeting and luncheon ($1.00) will be held in the gymnasium of Vanderbilt Hall at 12:30 p.m.

SOCIETY MEETINGS, CONGRESSES AND CONFERENCES

May 10—Massachusetts General Hospital will hold a Clinical Meeting of the Staff in the Moseley Memorial Building at 8:15 P.M.

May 11—William Harvey Society will meet in the Auditorium of the Beth Israel Hospital at 8 P.M.

May 12—Institute on Health Education in the Secondary Schools. See page 1036.

May 12—Harvard Medical Alumni Association. See notice above.

May 14, 15, 16, and 17—Thirtieth Annual Meeting of the National Tuberculosis Association. For details apply to the National Tuberculosis Association, 450 Seventh Avenue, New York City.

May 15—South End Medical Club will meet at the office of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston, at 12 noon.

May 16—New England Physical Therapy Society. See page 1041.

May 16—New England Obstetrical and Gynecological Society will hold its spring meeting at Portland, Maine. The registration of members will take place at the Maine General Hospital from 9 A.M. until 1 P.M., and in the afternoon at the Chamber of Commerce Building, 142 Free Street, from 2 P.M. until 5 P.M.

FRED J. LYNCH, M.D.
475 Commonwealth Avenue, Boston.

May 18—The New England Roentgen Ray Society. See notice above.

May 19—The New England Pediatric Society will meet at New Haven, Conn., at 2:30 D.S.T. Information may be obtained from the Secretary, Dr. Gerald Hoeffel, 319 Longwood Avenue, Boston.

May 21, 24, 25—New England Heart Association. See page 1041.

May 26, 27, 28, and 29—The American Association on Mental Deficiency. Details may be obtained from the Secretary, Dr. Groves B. Smith, Godfrey, Illinois.

June 7, 8, 9—Annual Meeting of the American Association for the Study of Goiter. See page 1041.

June 12—American Heart Association will meet at 9:30 A.M. at the Cleveland Hotel, Cleveland, Ohio.

July 24-31—The IVth International Congress of Radiology will be held in Zurich under the presidency of Professor H. R. Schniz. General Secretary Dr. H. E. Walther, Gloriastrasse 14, Zurich.

August 18 - September 30—Medical Study Trip to Hungary. See page 975, issue of May 10.

September 3-6—American Public Health Association, at Pasadena, California. Dr. J. D. Dunshee, Chairman, Local Committee on Arrangements.

September 4, 5, 6—International Union Against Tuberculosis. For information address the National Tuberculosis Association, 450 Seventh Avenue, New York City.

DISTRICT MEDICAL SOCIETIES

BERKSHIRE DISTRICT MEDICAL SOCIETY

May 14—See notice elsewhere on this page.

BOOK REVIEWS

The Life of Sir Robert Jones. By Frederick Watson. 318 pp. Baltimore: Williams & Wilkins Company. $3.75.

The Life of Sir Robert Jones by Frederick Watson, son of Ian Maclaren and son-in-law of Sir Robert, is one of the great medical biographies of our time. Affection prompted it; intimate knowledge made it possible, and a facile pen wrote it. All these three activating factors were necessary if the world was to have a true picture of one of the greatest of surgeons, and the most lovable of men.

The biographer has had access to family chronicles and personal letters, to war documents and plans of medical organization. With his own eyes he has watched the dreams of this happy and valiant warrior reach a fruition rarely realized in the lifetime of the dreamer.

Rehabilitation of the wounded soldier, of the handicapped civilian, and of the crippled child was the passion of this most famous of orthopedic surgeons. Throughout the book the strength and sweetness of Sir Robert's character are evident in all his thoughts and plans and acts.

It is an inspiring book no less for civilians than for physicians and medical students. It stimulates hero worship of the finest type. There is wealth of fascinating anecdote and stirring struggle, of close friendship and warm family life. The sidelights on noted men and women of our day are illuminating and well directed.

There was an earlier recognition of Sir Robert's originality and eminence in America than in England. Many American surgeons have experienced his priceless friendship.

The epilogue, "The Personality of Robert Jones," is a fitting contribution by the author who elsewhere scarcely appears in the book so vivid is the narrative and so successful has Mr. Watson been in submerging his own personality in that of his great subject.